THE INSTITUTION OF CIVIL ENGINEERS.

The following list of subjects for papers for the Session 1872-73, has been issued by the Council of the Institution of Civil Engineers, London, who invite communications dealing in a complete and comprehensive manner with any of the subjects comprised therein, as well as upon others, such as:—

a. Account of the Progress of any Work in Civil Engineering, as far as absolutely executed (Smeaton's Narrative of the Building of Eddystone Lighthouse may be taken as an example.)

b. Descriptions of distinct classes of Engines and Machines of various kinds.

c. Practical Essays on Subjects allied to Engineering, as, for instance, Metallurgy; and

d. Particulars of Experiments and Observations connected with Engineering Science and Practice.

LIST.

1. On the Application of Graphic Methods in the Solution of Engineering Problems, and in the Reduction of Experimental Observations.

2. On the Elasticity, or Resistance to Deflection, of Masonry, Brickwork, and Concrete, with observations on the Deflection of the tops of Bridge Piers, by unequalloading of the Arches abutting on them.

3. On the Methods of Constructing the Foundations of some of the Principal Bridges in Holland and in the United States.

4. On bridges of large span, considered with reference to examples, now in progress or recently completed, in the United States; including an account of the testing, and of the effects produced by variations of temperature.

5. On the Theory and Practical Design of Retaining Walls for sustaining earth or water, and on experimental tests of the accuracy of the various theories.

6. On the Different Systems of Road Traction Engines, with details of the results in each case

7. On the Use of Concrete, or *Béton* in large masses, for Harbor Works and for Monolithic Structures.

8. On Dredging Machinery, and on the cost of raising and depositing the material.

9. On the Appliances and Methods for Rock-boring and Blasting, in this country and abroad, and on the results obtained.

10. On the Gage of Railways.

11. On the Systems of Fixed Signals on Railways, and on the connection between the signals and the points.

12. On Modern Locomotive Engines, designed with a view to economy, durability, and facility of repair, including particulars of the duty performed, of the cost of repairs, etc.

13. On the different Systems for Surmounting Inclines on Mountain Railways.

14. On the various Modes of Dealing with Sewage, either for its disposal or utilization.

15. On the Separate System of Sewering Towns, with a detailed description of the works in a town to which this system has been wholly or partially applied, and particulars as to the results.

16. On the Ventilation of Sewers, with a *résumé* of the Experiments as to the motion, pressure, etc., of Gas in the Sewers.

17. On the Constant Service of Water Supply, with special reference to its introduction into the metropolis, in substitution for the Intermittent system.

18. On Street Railways and Tramways through Cities and Towns, and on the best mode of working them.

19. On the Application of Steam as Motive Power for pumping Water or Sewage, with a comparison of the advantages of different classes of Engines, and details of the cost of working for long periods.

20. On the various descriptions of Pumps employed for Raising Water or Sewage, and their relative efficiency; and on the employment of Water as a Motive Power for pumping, by means of Water Wheels, Turbines, Water Pressure Engines, or other Machines.

21. On the Employment of Steam Power in Agriculture.

22. On the laws governing the Flow of Steam and other Gases through Orifices, Pipes, etc., and on Experiments to determine these Laws.

23. On the Methods of Transmitting Force to distant points.

24. On the best practical Use of Steam in Steam Engines, and on the effects of the various modes of producing Condensation.

25. On the modern practice of Marine Engineering, having reference to Economy of Working Expenses, by Superheating, Surface Condensing, great Expansion, High Pressure, etc.

26. On the Present State of Science in regard to the Manufacture of Gas for the purposes of Illumination.

27. On the Construction of Sluices, for the expeditious filling and emptying of Locks of large size on navigable Canals.

28. On the Harbor and Dock Works at Spezzia.

29. On the Maintenance, by Sluicing, of the Harbors on the Coasts of France, Belgium, etc.

30. On the Practice and Results of Irrigation in Northern India.

31. On the Sea Works at the mouth of the Adour, and the effect produced by them on the bar of that River.

32. On the Sea Works at the mouth of the River Maas, and the effects produced thereby.

33. On the Manufacture of Iron and Steel as now pursued, the effect on strength and tenacity of the admixture of substances with the Ore, and any test, other than fracture, by which the quality may be ascertained.

34. On the various Methods of Draining distant isolated sections of Mines.

35. On Compressed Air as a Motive Power for Machinery in Mines, with some account of its application on the Continent.

36. On the Use of the Diving Apparatus in Mines, especially in Westphalia and in Germany.

37. On the Systems and Apparatus at present used in Telegraphy.

For approved original communications, the Council will be prepared to award the Premiums arising out of special funds devoted for the purpose. They will not, however, consider themselves bound to make any award, should there not be any communication of adequate merit; but on the other hand, more than one premium will be given, if there are several deserving memoirs on the same subject. It is to be understood that, in this matter, no distinction will be made between essays received from a Member or an Associate of the Institution, or from any other person, whether a native or a foreigner.

The communication should be written in the impersonal pronoun, and be legibly transcribed on foolscap paper, on the one side only, leaving a sufficient margin on the left side, in order that the sheets may be bound. A concise abstract must accompany every paper.

The drawings should be on mounted paper, and with as many details as may be necessary to illustrate the subject. Enlarged diagrams, to such a scale that they may be clearly visible when suspended in the Theater of the Institution, should be sent for the illustration of particular portions.

Papers which have been read at the meetings of other societies, or have been published in any form, cannot be read at a meeting of the Institution, nor be admitted to competition for the premiums.

The communications must be forwarded, on or before the 31st. December, 1872, to the house of the Institution, No. 25, Great George Street, Westminster, S. W., London, where any further information may be obtained.

[American Journal of Pharmacy.]

A NEW APPLICATION OF TUBE HYDROMETERS.

BY WILSON H. PILE, M. D.

A plain cylindrical tube of thin glass, closed at its lower end, is to be immersed in pure water, at a temperature of 60° F., and then loaded by pouring in shot or mercury until it sinks about two thirds of its length in the water, the point to which the surface of the water rises being then marked on the tube. If now that part of the tube which was immersed in the water be divided into 145 parts, and these parts numbered from the top downwards, the tube will represent a Baumé's hydrometer for liquids heavier than water; and by floating it in any liquid of greater density than water, its degree will be seen on the tube at the surface of the liquid.

These degrees can be marked on paper, and the paper inserted in the tube and pushed down to the bottom, the upper mark or zero being exactly opposite the mark which had been previously made on the tube.

We will now proceed to show a new application of these tube hydrometers in determining densities.

Having immersed a tube, closed at the lower end as before, in water, we pour water into the tube until it sinks about $\frac{1}{3}$ of its length.

It should float upright. We are now to mark the surface of the water in which the tube floats, and also the surface of the water within the tube. The tube below this latter mark must then be divided into 145 parts, either by etching on the glass or, what is more practical, by drawing a scale on paper, numbering the degrees from the top (0°) downwards. In ascertaining the density of any liquid heavier than water, the tube must be emptied and dried by rinsing with alcohol and drawing air through it by means of a long tube, then immersed in water of 60° F., and the liquid to be tried poured in until the tube sinks to the upper mark. It can then be taken out, and the degree of density shown on the tube, if it be etched, or else by holding it on the paper scale in its proper position.

Our illustrations have been thus far for liquids heavier than water; for those lighter than water, the tubes or scales require a different division. Unfortunately, Baumé's method of dividing his hydrometers rendered the degrees of those for light liquids larger than those for heavy liquids, and by comparison we find that they are in the ratio of 145 to 140. In order, therefore, to make a scale for light liquids, we divide the space below the surface of the water within the tube into 140 parts instead of 145 parts, as at first; the degrees are then continued upwards 70 or more parts. These divisions are numbered at the water point 10° (another peculiarity of Baumé's scale), and running upwards so high as desired. The scale below the water point need not be marked, as it can be only used for liquids lighter than water.

The tube is used for all liquids in the same manner, namely, by pouring into it the liquid to be tried until it sinks in water down to the mark made at first on the tube; then by holding it against the paper scale marked as just described. The surface of the liquid will indicate its proper degree of density.

An advantage which the tube possesses, when used in this manner, is the small quantity of liquid necessary, as the tube can be made quite small in diameter, and by increasing its length the degrees are rendered larger, and thus greater accuracy is obtained. It may also be employed in ascertaining the density of extremely heavy liquids, where no hydrometer could be found of service.

Before you ask a favor of any man consider three things. First, can you not avoid it? Second, can the one you apply to grant it? Third, would you, if your places were reversed, do for your friend what you ask him to do for yourself? It is well to think of this, as it may change the whole question.

The Great Fire of Boston.

In a discourse on the Sunday evening after the fire, Mr. Henry Ward Beecher, of Brooklyn, N. .,N made the following observations, which are full of interest and common sense: Last year it was Chicago that was destroyed: now it is Boston. The West and the East are at last united by a common calamity. Boston is thoroughly identified with the whole history of this country, for from it sprang all that is great and good of American ideas. The earliest heroes of liberty were from there; the war of independence began there; it was from there that Jefferson sought the Adams who aided him in making the laws for the newly-formed Republic. Boston has always been the true head of the nation, and never flinched at the call of liberty. American history began in Boston, which city has never ceased to be the brain of the country for knowledge, liberty, and religion. Boston never went back from its duty when other cities swerved from theirs. Hated she may have been by some, but there is not a city in the United States that is not indebted to her for schools, literature and scholars, from the earliest day of the Republic to the present time. No other city of the Union ever gave such a common school education to all as Boston has done; from the highest to the lowest grade, education has she willingly given to her poorest son or emigrant resident. God could not have laid the heavy hand of fire on a city more noble than this. It is a national calamity. Some may say the disaster was sent to humble their pride or their avarice. If such were the case, no city would escape. Under such Providence, where would New York and Brooklyn be? With such a law no spot on the earth ought to be saved. Such an assertion is presumptuous, it is audacious. A sparrow cannot fall without God's knowledge; yet sparrows do fall. Such remarks are in defiance of God's wisdom and equity. Instead of making them, we should take lessons from the disaster, for it teaches a great deal. It teaches us that, in the construction of streets, individual rights should not set at nought the general interests. Why were the streets so narrow? This fire was no accident, for it will be found that it followed a general law throughout. The plague, fever, and fire were the best architects of the London of to-day, and also of many other cities. The fire teaches Boston that it is not needful or wise to have narrow streets to convey the flames from one side to the other, or to act as horizontal funnels to carry the fire from one block to another. But the answer will be that the streets have been so for a hundred years, and there has been no fire. Is it necessary to have such a fire even once in a century? This fire will show that it is not needful to build houses four or five stories high of fireproof granite, and then surmount them with an inflammable box, out of the reach of firemen, for the fire devils to sport in and scatter their sparks all over the city. Architects could not see this result, and bitterly the city is now paying for the experience. Other cities not far from here may also have to pay as dearly for their parsimony in erecting buildings. Why not make every business house a separate fire department? We can carry light and water in the hollows of walls to any part of a building we choose. Why not have the means of extinguishing incipient fires also built in the hollows of walls, and each man in the place a fireman?

American Nickel.

In the arts, nickel is rapidly growing into favor as a substitute for silver in plating steel, iron and other metals. Its commercial demand is rapidly increasing, and as it is much cheaper than silver, it will undoubtedly be adopted in the manufacture of many articles as a substitute for that more precious metal. One mine, the Mine La Motte tract, Missouri, was worked from 1850 to 1855. The ore was the sulphuret, associated with lead and copper. About $100,000 was realized from the croppings of the vein. Croppings of nickel ore are found also in Madison, Iron and Wayne counties, Missouri. The refined metal is worth $3 per pound. For small coins, it is very useful. The principal supply is at present derived from a single mine in Lancaster county, Pa. It has been worked for seventeen years, and developed to a depth of 200 feet. The length of this lode is between two and three thousand feet, and it produces from four hundred to six hundred tuns per month, employing in the working of the mine a force of 175 men.

A CRIPPLED rogue in Philadelphia has found a new use for an artificial leg. He worked in a pipe factory and was in the habit of filling his porcelain limb each day with a choice assortment of meerschaums, which he disposed of on his own account. When discovered, he had made about $800 by this illegitimate traffic. In this way he was walking off with a goodly share of the profits of the establishment.

CALIFORNIA does everything on the biggest sort of a scale. A bee hive in the rocks in Los Angeles county is reported, and is said to be 160 feet deep, entrance 30 feet wide and 17 feet deep; it contains several tuns of honey. In fact the sweet liquid runs, on warm days, in a small stream from the hive, from which the settlers supply themselves.

A MAINE sea captain suggests that telegraph wires be extended to all the lighthouses on the coast, and that a system of signals be arranged to be exhibited from the lighthouses to give notice to passing vessels of approaching storms or changes of wind. The idea is a good one.

CELERY, as an article of dish, is highly recommended for nervousness. A correspondent says he has known persons cured of nervousness, whose hands shook like aspen leaves. He recommended the daily use of it at meal times.

SEVEN patents have been granted for policeman's clubs.