THE GREAT EXPOSITION—LETTER FROM UNITED STATES COMMISSIONER PROFESSOR R. H. THURSTON.

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The number of visitors entering Vienna seems to increase slightly as the increasing warmth of the season drives tourists northward from Italy. Rome and many other of the more interesting cities of the peninsula become extremely unhealthy, as the heat of summer begins to produce putrefaction and decay wherever organic matter is left exposed to the air; and miasmatic emanations, thus set free to contaminate the atmosphere, produce a class of diseases, of which fever and ague, the dreaded Roman fever, and the still more dangerous yellow fever, are examples. The prevalence of such diseases in Southern Europe this season is attracting comparatively little attention, however, as occasional outbreaks of the cholera, here and there, distract the attention of the people, and give warning that a vastly more dreadful disease may become epidemic, if not provided against with the greatest possible care.

Cases of cholera occur in Vienna daily, but they are not usually of the Asiatic type. The government is taking every precaution against the entrance and the spread of the disease. The police are compelled to watch for cases of sickness and to remove at once to the hospital any person ill with cholera, or with any contagious disease. The use of disinfectants throughout the city is compulsory, and the police are charged with the supervision both of public streets and of private dwellings. Men are detailed to distribute disinfecting materials, and to see that they are actually used. Where such precautions are taken to keep a city thoroughly clean and to guard against the importation of disease, it may be confidently anticipated that no disease will become epidemic. Unless the action of the authorities of New York during the present summer is in marked contrast with that taken during those which have preceded, Vienna is far more cleanly and is far better fortified against epidemic diseases than is our own metropolis.

Some other European cities are equally well cared for. The city of Dresden is an example. During the past month, itis officially reported that 36,614 pounds of disinfecting powder have been used by the police of that city, and 34,318 pounds of sulphate of iron and carbolic acid. The dreaded disease has entered the neighboring villages, but the newspapers to-day report that no cases have occurred in the city itself for many days.

It begins to appear probable that our own country will be compelled to learn by experience the importance and the necessity of making special provision against epidemic diseases a matter of municipal and governmental action. It would be far more economical and more satisfactory to learn from the experience of European cities.

At the *Welt-Ausstellung* there is no change observable in the number of visitors. Those departments in which are exhibited the finest works of art are always crowded, while those in which are to be seen objects of less interest have comparatively few visitors. The magnificent collection of

PRECIOUS STONES AND JEWELRY

in the French Department is naturally very attractive, particularly to the ladies, and is really wonderful in the variety and richness of the display.

The French excel in all such work, and wherever delicate workmanship, elegant design, and richness of decoration go together. One of the most attractive cases in the French section is that in which are displayed the automaton birds. A number of small cages contain each a bird, whose lifelike attitudes and motions and melodious songs almost convince the visitor that the card indicating the fact that they are automatons is placed here by mistake. However, the general rule that beautiful plumage and the power of singing well are not conferred by Nature upon the same individual, and the prices asked—from 250 francs ($50) upward,—are good evidence on the other side.

The French are well represented by their artists and quite well in

SCULPTURE,

but, as might be expected, the finest statuary is from Italy. The space assigned to the latter country contains a large number of excellent contributions, either by her own or by foreign artists resident there. One of those which, together, constitute a group forming a circle in the middle of the main building, is to many one of the most interesting objects in the exhibition. It represents the Egyptian girl presenting the infant Moses to the princess. The face of the girl is characteristically Egyptian, yet beautiful and full of expression. Her form and her attitude are equally graceful and natural, and the admiring spectator is almost persuaded that she is about to step forward and tell her story. The child is equally well represented. The boy half reclines in the ark of bulrushes, one little hand grasping its edge, and, with head raised, looks earnestly forward with an expression upon his face which can be interpreted either as indicating the child's prophetic vision of his coming life with its great work, or an earnest effort to read in the face of the princess some assurance of a kind reception. The features remind one strongly of the child's face in one of Raffaelle's paintings of the Madonna. This work of Barzagli has rarely been equalled by any sculptor of ancient or modern times.

From the Industrial Palace, I have been accustomed to go to the Machinery Hall through the British Agricultural Department, where are exhibited some exceedingly fine examples of agricultural machinery, and where I have been particularly interested in the display of

PORTABLE ENGINES,

a branch of steam engine construction, in which, as in compound marine engines, our transatlantic cousins have decidedly taken an important step in advance of us. We have very few builders of portable engines in the United States who produce machines of fair design, good workmanship, and even moderately satisfactory performance. It is also true that but few British builders place really creditable machines in the market. Yet the majority of the best builders of Great Britain have produced portable and agricultural steam engines which excel very greatly those constructed by the majority of the best known builders in the United States.

At the annual exhibition of the Royal Agricultural Society, the premium for the most economical portable engine has, during late years, been given to the victor at a competitive trial made under the rules of the society and under the superintendence of competent judges appointed by the society. At these trials there is, as a matter of course, some "jockeying," but it may be assumed, with some probability of correctness, that the most skillful half dozen builders are likely to be the most skillful half dozen jockeys, and the results will serve very well as indications of the degree of perfection reached by them. The horse power is determined at these trials by the dynamometer as well as by the indicator, and, taken altogether, the reports afford exceedingly valuable contributions to engineering knowledge and literature. In some instances, the dynamometrical horse power has been obtained by the expenditure of but from two and a half to two and three quarters pounds of fuel per hour by the best machines, while some of their competitors expend five pounds or even more. These remarkable results are obtained only by the most careful preparation for, and conduct of, the trial. The engines are built in the most careful manner and are frequently kept under an informal trial for weeks before being sent to the exhibition for competition. Every fault is thus discovered, and the attendants are also thus made thoroughly trained "jockeys." On the trial, the fuel is handled as if it were worth its weight in gold. Every piece goes into the furnace at the right time, and is thrown upon precisely the same spot on the grate. The feed water is uniformly supplied and enters the boiler heated by the exhaust steam to the highest possible temperature. The draft is carefully regulated, and the steam pressure and the speed of the engine are kept as nearly as possible unchanged from the beginning to the end. It is not so surprising, to one who understands what wonderful effect such precautions have in saving fuel, that remarkable economy should thus be attained, but it is not all due to management alone; much of this success is a consequence of excellence of design. It may probably be questioned whether any such engine, now to be found in the market and built in our own country, can compete successfully, under such circumstances, with some of these British built engines. While capable of teaching good practice in building stationary engines, we are capable of learning something in this humbler field. The machines exhibited here have such beautiful finish and are made of such exceptionally good material that we are probably justified in assuming that they are built to secure premiums, and that they do not represent in these particulars the average practice. They are, however, of standard design.

What may be termed the

STANDARD ENGLISH

portable engines, as built by the best firms, may be described as follows: The engine is mounted on the top of the boiler as in the usual style with our own builders. The cylinder is made with a steam jacket, and the valve gear is the ordinary arrangement of three ported valve, for small sizes, or the Meyer valve gear, in which the cut-off valves ride on the back of the main, in larger and more economical engines. Where provision for reversing it is necessary, the Stephenson link is used. At least one firm of high reputation have adopted the solid bar link, in place of the usual form of strap link. The readiness with which wear can be taken up, and its consequent comparative noiselessness and freedom from shock, also, are its advantages. The regulation is generally effected by the ordinary fly ball regulator operating a valve in the steam pipe. One firm uses the approximate parabolic regulator of Farcot; and in other cases a peculiar arrangement of governor on the crank shaft, by which it is made to alter the position of the eccentric, has been adopted, but whether successfully or not I am unable to state. The governor is invariably attached. The very excellent practice of bending the crank shaft to shape instead of building it up is general. Provision is made by means of an ordinary harness buckle on the regulator belt, for tightening it at any moment. The boiler is of the ordinary locomotive type, with large heating surface and a liberal calorimeter. The steam enters the steam cylinder by passing through the steam jacket, which it reaches through openings large enough to allow the steam to pass without interference with the drainage, back into the boiler, of all water of condensation. The exhaust passes through a feed water heater of large surface area, and thence into the chimney. Engine and boiler are both thoroughly covered and guarded against losses of heat by conduction or radiation. This last point, as well as the steam jacket, is too often neglected by engine builders, and with less excuse.

The casting of a steam jacket with a cylinder involves the risk of obtaining a largely increased proportion of bad cylinder castings; and its construction separately, as it must be made with large engines, is a matter of some expense, to say nothing of the fact that but few designing engineers understand the "dodges" which seem essential to successfully unite the cylinder and jacket; but there is no excuse for carelessness in covering the boiler and the steam cylinder with protectors against loss of heat and consequent waste of fuel. Many good engineers doubt the efficacy of steam jacketing, but none doubt the expediency of a liberal use of non-conductors and non-radiators wherever heat is to be retained.

But no design, however perfect, will secure satisfactory performance unless it be embodied in good material by good workmen, and unless its management be confided to experienced and skillful men. In material and workmanship, some of these engines are probably as near perfection as any machines that have ever been produced, and that good men can be found to take charge of them is proven by the splendid performance already alluded to. The use of

STEEL,

for connecting rods and piston rods, and for crank shafts, is becoming quite general, and progress in this direction may be regarded as one of the most important changes here observable. The substitution of steel for iron is taking place very rapidly now that the new metal, with its greater strength and toughness and its homogeneity, may be secured without very much greater expense than is incurred in the use of the less reliable material. The general use of "low steel" for locomotive work is also equally general, and is observed by the most careless visitor; and among the most creditable exhibits in Group VII are numerous locomotive crank shafts of "homogeneous metal," of which the beautifully perfect and highly finished surfaces are in strong contrast with the streaked and welded examples, of similar constructions in iron, with which only we were familiar but a few years ago.

R. H. T.

Artificial Fibrin as a Diet.

Dr. John Goodman, in a communication to the *British Medical Journal*, says of artificial fibrin: "As a member of the British Medical Association, and in the common interests of humanity, I have much pleasure in calling attention to my discovery of this new dietetic substance. So far as I have employed it, it promises fairto be invaluable in medical practice, especially in cases of feeble alimentation and deficient nutrition, and second to none in those cases where rejection of food forms a prominent feature, or where the appetite and digestive powers are reduced to a minimum. As fibrinous material, it is of course highly nutritious, and eminently adapted to all cases where there is a deficiency of fibrin in the blood. It is, perhaps, unparalleled in its qualities of lightness and digestibility, and is, moreover, a great delicacy. In many urgent cases of rejection of food, etc., it not only remains where an egg otherwise cooked would not be tolerated, but its presence in the stomach has been found to create a feeling of want rather than of superfluity, and to promote rather than decrease the appetite for food.

The production of this substance is within the reach of every sick room, and is effected with great facility. It is formed by exposing albuminous material to the operation or influence of cold water, for a given period; and on account of its great plenteousness we employ the ordinary hen's egg for its production. When the shell is broken and removed, and its contents are immersed in cold water for twelve hours or so, they are found to undergo a chemico-molecular change, and to become solid and insoluble. This change is indicated by the assumption, by the transparent white of the egg, of an opaque and snowy white appearance, which far surpasses that of an ordinary boiled egg. The product, and the fluid in which it is immersed, must now be submitted to the action of heat to the boiling point, when the fibrin will be ready for use."

We will add that on trial we find that, for table use, the eggs thus prepared are most excellent, and this method of preparation will no doubt soon come into general use. Instead of boiling in the water in which the eggs are originally placed, they may be removed therefrom after standing twelve hours and put at once into boiling water.

Jeannel's Horticultural Fertilizer.

We are in receipt of several inquiries regarding the ingredients of an artificial fertilizer mentioned some time since in our columns, as devised and used with great success by Jeannel, of Paris. The recipe was translated *verbatim* from *Les Mondes*, as that journal extolled the performances of the compound in the most laudatory terms. The biphosphate of ammonia, which forms the stumbling block for many of our correspondents, should probably be phosphate of ammonia.