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ADDRESS

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(FELLOW.)

PRESIDENT OF THE SECTION.

IT is the custom of the presidents of sections to inflict on the members a short address, and generally the matter of it has been concerned with some phase of work in which they are specialists. I am unable to follow this course, because the direction in which I may be said to specialize has no general interest. I propose, therefore, to refer to some matters in connection with building which I think deserve special consideration, and which may be said to come within the aims of The Royal Sanitary Institute.

The architectural and engineering professions are more or less conservative, and changes in building construction and engineering practice are gradual and slow; but there are occasions when some marked departure from the usual methods takes place with apparent speed; this is generally only after long incubation, and there is something more or less out of the ordinary that has led to it.

The introduction of iron joists had a considerable influence on building construction, almost entirely throwing out of use cast-iron or wooden beams; and the introduction of steel further emphasised this change, and for some time past skeleton steel structures have been multiplying. The general desire nowadays is, in regard to the majority of buildings for other than domestic purposes, to provide structures which, while economy has to be duly considered, are the best that can be devised to resist fire; and for this object wood has to be abandoned so far as possible, and all

steel has to be covered with some material which is a bad conductor of heat. Portland cement concrete is being generally used for the purpose. This obviously adds to the cost of such structures. The consequence has been that reinforced concrete, which for the last ten years has been occupying the attention of many people, has almost suddenly burst upon the professions in this country, and has provoked an unusual amount of interest. We are much behind other nations in this respect.

The question of economy and strength, together with lightness, in the first place forced railway and dock companies to take this method of construction into serious consideration. Owing to bad and unequal foundations upon which, in the case of docks, warehouses and other similar structures had to be constructed, lightness and homogeneity became important considerations. These qualities have considerable influence on cost, which is small in comparison with the usual brick buildings, while concrete piles, which are practically indestructible, take the place of those of wood. The structures thus erected, such as the warehouses on the quays of the Manchester Ship Canal and the goods warehouse at Newcastle for the North Eastern Railway Company, forced themselves upon the notice of architects, and these came to consider why, if such buildings could be erected for railway and dock purposes, the system should not be utilized for ordinary building objects, such as factories and large structures. The various building regulations have stood in the way of the general use of reinforced concrete because, as in steel frame structures, the outer walls were required to be of the same thickness and strength as if they were intended to carry the superstructure, although there are a few local bodies which have permitted elasticity in this respect. At all events, these regulations in the main only permitted the construction of floors and their supports to do the work required. The obstructions thus raised, and the fact that the whole business was practically in the hands of specialists and patentees, has hindered the more general adoption of this form of construction. It is, however, to be hoped that the rules comprised in the Report, which have been prepared by the committee appointed by the Royal Institute of British Architects, may enable local authorities to establish standards, and thus afford freer facilities for users, and that the members of the profession will find it as necessary and as easy to make calculations as they have done in the case of steel.

Municipalities have largely availed themselves of this method of construction, and no doubt would more extensively do so were loans obtainable for the same term as for the ordinary methods of construction. For instance, sewers can, I believe, be constructed at about half the cost of

those in brick, but as loans can only be procured for half the usual term, which implies some doubt as to the life of such constructions, the preference is given to old forms by bodies who have not sufficient courage to arrive at an independent judgment, consequently double the money is expended that is necessary; and even if reinforced concrete is adopted, the annual payments are the same in amount, although, of course, there is only half the number.

The advantages of reinforced concrete are numerous, although at present there are comparatively few builders or contractors who lay themselves out to execute such works, but the numbers are increasing and will do so more freely so soon as the system of licenses comes to an end, while in course of time, I think, supervision will become more easy as general acquaintance with the construction extends.

Reinforced concrete construction is the best fire-resisting system at which we have yet arrived, assuming that the steel is properly covered, severe fires showing that it suffers little damage, which, however, can easily be made good, and it confines fires within the enclosing area. There results a great saving of space owing to the thinness of the external walls, retaining walls, etc., and it is astonishing what pressures these latter can resist. There is no space for vermin, the solidity of the structures being complete, unless such spaces are required for other purposes. In engineering works the economies should be greater than in ordinary building, retaining walls and bridge work showing remarkable lightness and strength. The objection to the material lies in the necessity for foresight, and the early settlement of such items as in ordinary construction generally lead to a large expense in cutting away, as for lifts, electric lighting appliances, heating apparatuses, and similar services.

The cost of such operations in reinforced concrete demands early consideration and settlement on the part of those responsible. I regard this as a good point as tending to bring these gentlemen up to the scratch, and induce them to make up their minds at an early date instead of postponing everything of the kind till the last moment because "it is so easy to cut holes when and where they are wanted," frequently at those places which have no superfluity of strength. I anticipate that some difficulty may arise in plastering and other internal and external finishings, owing to the non-porosity of the material, and therefore the want of adhesion consequent thereon. However, I have no doubt that this difficulty will be surmounted, and that externally, at least, it will be found possible by the use of suitable moulds to leave the surfaces from those moulds. This I am partially doing already, and in regard to treatment externally there is

abundant room for the invention of designers. I find that a 7 in. or 8 in. wall against earth can be made impervious to moisture, there must therefore be a reduction of air passing through as compared with ordinary walls, which should be considered in connection with ventilation problems.

The simplicity of the construction alters the proportion of the trades employed, carpenters taking the place of bricklayers, while labourers can no longer be employed to construct centering as is now the case, but their numbers are largely increased. Consequently, during the construction of the carcase carpenters and labourers are employed in something like the proportion of 2 to 5, bricklayers being seldom needed. The material consisting of round rods, cement, sand and aggregate, there is little trouble in obtaining them, and the delays attending built up girders and other forms of construction are in the main avoided.

Doubts have been raised as to the stability of this form of construction, but I think that these need not cause any anxiety to those who use it. It has been repeatedly shown that the steel does not oxydise when covered with concrete such as is used for the purpose, and that accidents, none of which have occurred in this country, have all been traced to causes which should not have existed. The explanation of that at Milan in April last has not, so far as I know, reached this country, but the photos which I have seen would imply bad or imperfectly-set concrete. Of course, if the work is not properly designed and carried out accidents must occur, as in any ordinary form of construction.

The sanitary principles which should apply to the planning and arrangements of buildings are now very generally understood, but it seems to me that the stringent tests which are employed for drains must lead to the abandonment of salt-glazed stoneware pipes, as no drain formed of such pipes is likely to stand the usual tests after a few years. This I look upon as unfortunate, because a slight leakage outside the area of any building cannot give rise to any harm, and, moreover, there are very few street sewers that could stand similar tests. Having regard, however, to the probability of having to relay such drains after a few years if no leakage is to be permitted, there is no alternative but to use iron pipes throughout, although personally I have a preference for the stoneware.

Plumbing work can now be done in the most excellent manner, and the action of the Plumbers' Company, with the able co-operation of its Master and Clerk, has tended to produce a body of workmen who thoroughly understand the objects of the work they do and who are first-class craftsmen. The payment made to them is no more than to others, and I therefore strongly recommend that such men should have the

preference for sanitary works at least, and that encouragement be thus given to men to join the ranks of certified plumbers.

The great diversity of the requirements of local water authorities renders it important that water fittings should be standardized, and that what is found to be good for its purpose and approved by one company should meet the requirements of another. Some public authority should set up the necessary standard, of which there should be two classes as regards strength. I suppose that the limit of water waste preventers to two gallons will remain, but the quantity is meagre, is certainly the minimum, and often leads to a double consumption. I prefer larger cisterns, and use them where the regulations do not apply, as is usual with meter supplies, but even then authorities will not consent to cisterns of larger capacity. Another half-gallon would be of decided advantage. The two-gallon supply requires careful adjustment in all parts of the apparatus.

I desire to draw attention to the question of paint. Hitherto white lead has formed the chief ingredient, and as it has very deleterious effects on the health of the workpeople engaged in its manufacture, and upon those using it, unless special precautions are taken, and which are always difficult to enforce, it is most desirable that its use should be limited or discontinued. The latter, I believe, has been done in France, zinc oxide, ordinarily known as zinc white, being substituted. The matter was taken up by the Home Office some time ago. There is much prejudice against the use of zinc white, the majority of painters preferring white lead without having taken any adequate steps to ascertain what the substitute is capable of, but at the same time the use of zinc white is growing extensively, owing chiefly to its being largely employed in the manufacture of ready-mixed paints having well-known names. Very few painters, however, are aware of this fact, as although in favour of white lead they frequently uphold various brands of zinc paints. Zinc white is especially useful for painting in white or light tints, as it changes very little in colour on exposure; so different to white lead, which turns to a yellow tint. It is innocuous, and it is the duty therefore of all those having the opportunity to require its use in preference to white lead.

It is little understood, and education is required, but I am convinced that better work can be done with such paint at certainly not greater cost if the right materials are employed in suitable proportions, while its lasting qualities in some situations, especially where exposed to sea atmosphere, are much superior. Owing, as I have said, to the want of

knowledge in regard to it the paint should be obtained ready mixed from trustworthy manufacturers, which will lead to satisfactory results, and I have found that, if carefully used, two coats can be made to cover new plaster work on walls in a satisfactory manner with suitable colours. The materials should be zinc oxide (not more than 2 per cent. of impurities), refined boiled linseed oil, and oil varnish. Mixing by hand should be deprecated.

The question of smoke abatement with reference to household fires is one of considerable importance, and a short time ago the Smoke Abatement Society carried out a series of experiments with a variety of grates and gas stoves with the assistance of H.M. Office of Works. The report on grates will be found in the *Lancet* for 19th May, 1906. The number of grates submitted for test was considerable, but did not include all descriptions; though the numbers and forms were sufficient to enable one to arrive at a fairly accurate idea of the design which might be expected to give out the maximum of heat with the least expenditure of coal and smoke. Four makes of grates were found to give about equal results; but they vary considerably in pattern, the only common point being that the backs sloped upwards and towards the room more or less, an arrangement which has been regarded for years as necessary to ensure consumption of smoke. In one case the basket projects considerably into the room, and three have bottom bars and ash pans or frets, forming them into slow-combustion stoves. From examination of the several patterns I came to the conclusion that the fire-basket should be shallow in depth, project slightly into the room and be furnished with an adjustable blower, while the firebrick should be substantial in thickness. With the kind of stoking that is customary in private houses freedom from smoke cannot be expected, and still less can it be hoped for in connection with the kitchen range; this is probably the worst offender and is going all the year round instead of only during the cold weather, as in the case of grates.

Drs. Parkes and Des Vœux in their paper read before this Institute in November last year advocated gas, and in the case of large buildings hot water or steam heating. Except in cases of intermittent use there is no doubt that the cost of gas is much in excess of that of a coal fire, and this will prevent its adoption in the majority of cases, and in regard to hot water or steam heating one is faced with a demand for artificial ventilation, even in cases of ordinary occupation. This is serious, and while adding to the general expense is open to the objection that constant adjustment is required. There is no doubt that in the case of office buildings hot water or steam heating has the advantage, the former by

preference. The warmth is more evenly distributed, and the general experience is, I believe, that there is greater freedom from catarrh and other similar complaints, corridors and entrances being warmed in the general scheme, and so far as my experience goes in the case of offices occupied for some seven or eight hours per day the use of mechanical ventilation is by no means proved to be necessary, provided fresh air is passed through the radiators, and that there are other means of air inlet and exhaust flues. The case is, of course, different where large numbers are assembled in one room. Apparently there is little objection to the open gas fire, but closed ones are to be avoided owing to their liability to go wrong, and then the products of combustion escape into the room. A number of gas stoves were experimented with in the same room as the grates, and the full report will be found in the *Lancet* for 17th November, 1906. Dr. Rideal's experiments on the effects of gas combustion and electric lighting on the atmosphere of a room are interesting in this connection, as they show that gas is much less innocuous by comparison than was generally supposed.

This city, Cardiff, is marked by the general progress which it has made in recent years. It has provided new administrative buildings and new law courts, while the docks continue to expand and enlarge, and it is a most appropriate place in which to hold this Congress; the visit can only be of advantage to the members of the Institute.