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FIELD WORK IN CONCRETE AT UNIVERSITY OF WISCONSIN.*

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Concrete floors in masonry buildings offer many advantages as compared to the best timber construction, aside from resistance to fire.

Steel and tile floors commonly used in the so-called standard fire proof construction are too expensive for ordinary work such as dwellings and other small buildings. The comparative merits of each as a fire resistant has not been given the thorough tests that time will afford, but it may be they are about equal. For buildings not more than five storeys in height brick walls and concrete floors appear to be the most economical and to unite the advantages of the old and the most modern systems of construction. Such buildings can be erected with the same thickness of walls as good construction demands and the sole difference in cost as between ordinary and fire proof construction is the excess cost of concrete floors and fire proof partitions over those of timber.

One of the chief expenses in reinforced concrete work is the false framing upon which the concrete is poured. About fifty per cent. of the lumber used in making false work is usually destroyed on taking down. Any system by which the major part of this can be saved results naturally in a decrease in the total cost of the building. In applying concrete construction to small work the scale of parts involves expensive and intricate preparation of false work so that the cost of this part sometimes exceeds the value of the concrete poured upon it.

Small buildings, meaning those not over five storeys high, have been built since civilization began and their elements have been so specialized particularly in modern times as to meet in an excellent way all the various requirements of strength, convenience and good appearance. Provision for modern improvements have been practically standardized and become a habit with the carpenter, the plumber and other workmen. If these buildings were not subject to the danger of fire there would be no good reason for making radical changes in building methods.

The invention of steel and tile construction introduced quite different members into floors and brought a good number of difficulties, some of which have not yet been satisfactorily met. Among these are the fastening of wood floors, the placing of pipes in accessible places and the like. With the advent of concrete the faults of steel and tile construction were mainly conserved and others added. All of this was done with apparent unconsciousness and probably without knowledge. The problem of construction was taken over by the engineers, who from training and practice are better acquainted with questions of strains than details of convenience and architectural appearance.

The first concrete buildings were designed as economy of strength and expense would suggest. The wide spacing of beams, together with their large size, produced a result at once simple and scientific. The application of accessories

such as plumbing, heating, lighting, finish and decoration to these buildings was attended with some credit but not entire success. It was very soon discovered that the loss of continuous spaces in the structure of the floor and the recurrence of impervious beams at intervals having no relation to the division of rooms was no small inconvenience.

Very soon systems of construction securing flat ceilings were developed and the fact was emphasized by the designers while advertising other merits. The practice of imbedding pipes and wires in the concrete seems to meet the approval, however, of every one but the owners of the buildings. Experience with this practice shows its disadvantage. In concrete construction there cannot be permitted the usual "tearing up" of floors to repair electrical and plumbing work, etc., as in wooden floors. It is no easy matter to cut out concrete that has hardened for some time, and besides, as reinforced beams are designed, it is extremely hazardous to break into them at random. Whatever, therefore, is cast into the work is there "for all time," and there is a serious embarrassment whenever the owner wishes to remodel his building.

There is room for trouble also in constructions where a certain beam supports a considerable area. Such a beam is usually calculated to do the work intended, with a good margin of safety, but suppose the casting of the beam proves to be faulty, or in some manner the beam suffers slight damage. At once the entire area is threatened. This suggests the arrangement of many beams of small size, each supporting a small floor space. To this there arises the objection of increased cost. Beams of long span and narrow width suggest cross bracing, and again the comparison with wood construction suffers as regards expense. The good elements of wood construction are, however, precisely those of advantage in concrete. Wood beams are of long span, slight dimensions, and are set closely together. Each beam is braced to its neighbor by cross bridging. Under the beams all sorts of pipings are extended, and a flat ceiling is placed beneath. Upon the beams the floor is laid. What could be more reasonable and convenient? Should a pipe fail it requires only the removal of the ceiling for its repair. Should it be necessary to change the dimensions of rooms the necessary readjustments are readily made. Should a beam be slightly defective, or suffer injury, the beams adjacent will support the load, or if necessary, a section can be replaced without removing a large area of the floor. None of these advantages are to be had in the "mill type" of floor construction.

To retain the advantages of the ordinary form of construction and at the same time to effect a decrease in the cost of construction work would seem to be worth while. In order to bring this about a decided improvement in the false work must be made and the false work must be preserved for future use. At the same time methods of placing steel must be simplified and standardized so that it can be safely done without the assistance of a skilled engineer. The steel must be made secure while the concrete is poured upon it.

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