SCIENCE

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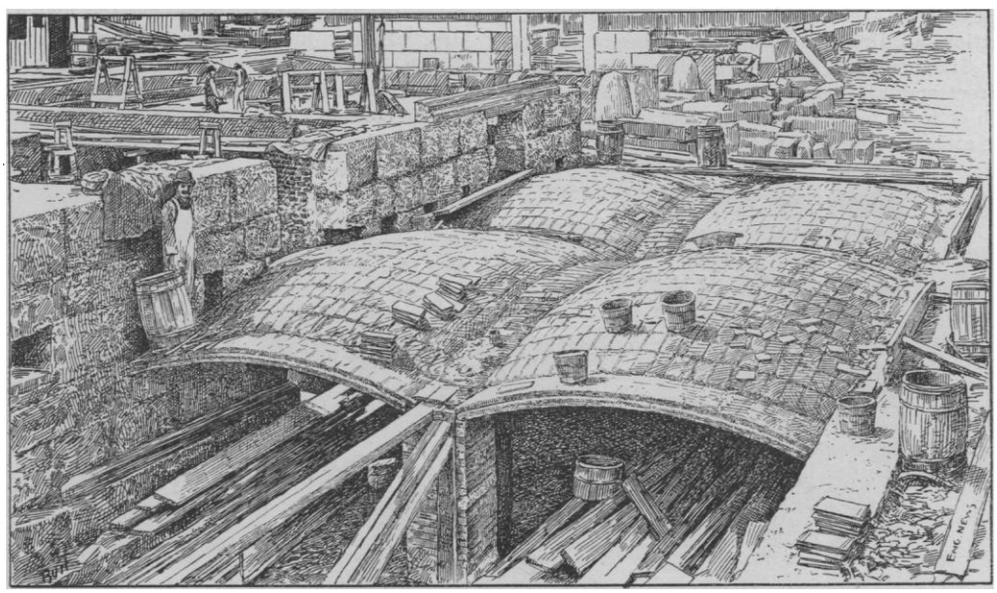
A NEW SYSTEM OF FIRE-PROOF FLOOR-CONSTRUCTION.

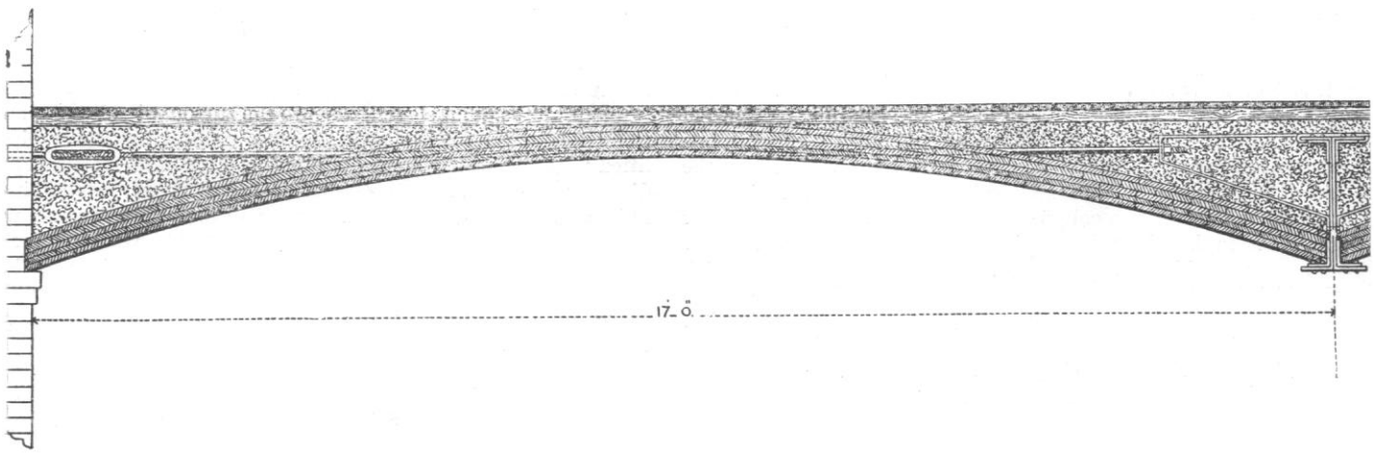
THE Guastavino Fire-proof Construction Company of this city is now introducing a new system of fire-proof floor-construction, which has many features of superiority to the ordinary system, and is especially valuable in that it reduces the cost of a fire-proof floor by nearly one-third.



TILE ARCHES IN NEW PUBLIC LIBRARY BUILDING, BOSTON.

The general features of the construction, as described in the *Engineering News*, are the use, to form the arches, of a hard, well-burnt clay tile, about one inch thick, six inches wide, and twelve inches long, laid flat, with the several courses breaking joints. A very light centring is used, and the first layer of tiles is laid with a quick-setting mortar, composed principally of plaster-of-Paris. The other layers are laid in a mortar composed chiefly of Portland cement. Its exact composition is a secret; but it adheres so closely to the tile, and is so firm and solid when it has fully hardened, that its strength is about equal to that of the tile itself, and the whole arch is practically a monolithic mass, showing no tendency to separate at the joints more than at any other point.

These tile arches are built in spans of five feet and upward, and either as plain cylindrical arches or as dome arches, as shown in the perspective view. The weight of the tiles is about one hundred pounds per cubic foot: hence an arch built of three layers of tile, which may be used for spans as great as twelve feet, will weigh about thirty-five to forty pounds per square foot, or but little more than half the weight of the brick



A NEW SYSTEM OF FIRE-PROOF FLOOR-CONSTRUCTION, ARION CLUB BUILDING.

arches as ordinarily constructed. The principal saving, however, is in the reduced number of beams used, owing to the considerably greater span which may be made with the tile arch. The prices for the work vary, of course, with the span and number of courses, and also with the location and size of the building under contract.

The system is by no means an experimental one, as a large number of buildings have already been erected with it, and many others are in process of construction. Among notable buildings in and near New York City, employing this method, are the Mount Sinai Hospital, the Young Women's Christian Association building, the Plaza Hotel, and the two new Edison Electric Illuminating Company's buildings. The new Public Library building at Boston is also being built by the system, and some of the domed arches under construction are shown in the accompanying engraving, made from a photograph. The other engraving shows the arches in the Arion Club building at Fifty-ninth Street and Park Avenue. In the Arion Club building the arches are seventeen feet span. In the Young Women's Christian Association building there are some arches of twenty-nine feet span. The company is now erecting a building at Fifty-seventh Street and Eleventh Avenue in this city, which will have an arch of forty feet span for the roof.

With these tile arches, some very fine architectural effects are possible. Where it is desired to leave the soffit of the arch exposed, a special flanged tile can be used which shows no joints when laid. Where desired, also, enamelled tiles can be used for the soffit, of such color as the architect may desire.

The great points of excellence claimed for this type of construction, however, are cheapness and great strength. In the construction of the Boston Public Library building, a heavy iron column fell from a derrick, and went end first through one of these arches. The arch, however, was not shattered by the blow, but remained solid and unharmed except for the hole broken out where the column went through. This system of construction has been in use in Spain for a number of years, and some notable buildings have been erected by it. One which should interest factory-builders in this country is a one thousand loom silk-mill at Barcelona, 371 feet by 330 feet in size. The weaving-room occupies the whole of one floor, and its arched ceiling is supported by 336 iron columns.

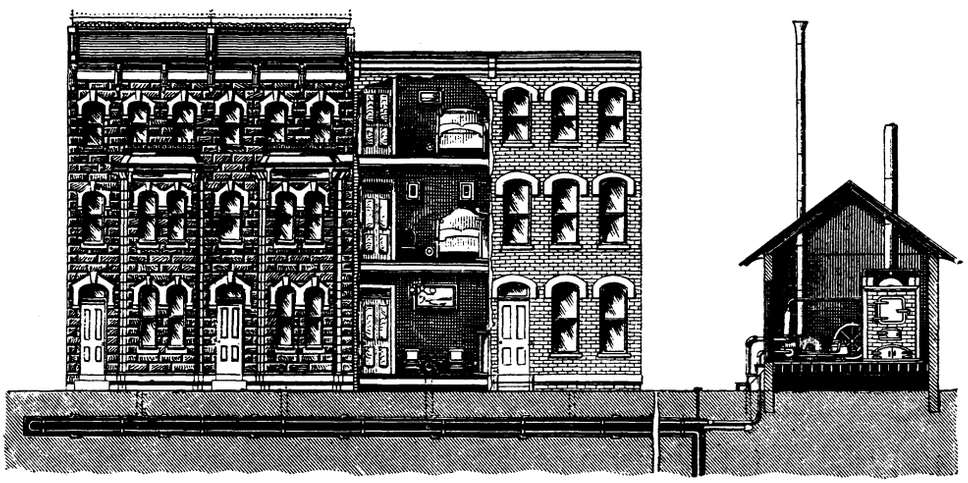
WAR-BALLOONS.

IT has hitherto been generally believed that the Montgolfier or hot-air balloon cannot be used in tropical climates. If this were true, ballooning for war purposes would of course be impossible in places where coal-gas could not be obtained. We learn from the London *Times* that Mr. Percival Spencer, who has been making a series of interesting balloon experiments in Central India, has succeeded in showing that the theory is without foundation. At Secunderabad, in presence of the garrison and a crowd of European and native spectators, he lately made an ascent in his patent asbestos balloon. The inflation was effected by the burning of methylated spirit inside the balloon, which was held in place by twenty-five soldiers of the Bedford regiment until the word to let go was given. After rising to a considerable height, the aeronaut descended by means of his parachute. The spot where the ascent was made is over two thousand feet above the level of the sea, and the achievement was all the more remarkable because of the sultry climate and the great rarity of the air.

HEAT AND VENTILATION.

To every man, woman, and child in this country this is an important and interesting subject. Science has made more progress in almost every other direction than in this, and naturally all improvements in heating and ventilating are carefully examined. The Hon. Hugh O'Brien, ex-mayor of Boston, at a public meeting and in addressing the mayors of New England, said, "In my judgment, there cannot be found in the city of Boston one single public building which could be considered as properly ventilated, and I would strongly recommend a fair and careful consideration of the Timby system of ventilating."

This Timby system is now attracting universal attention, especially in New England, and we are gratified to be able to present to our readers the plan given herewith, showing the manner in which this system is introduced. It is applied here as a street system, pure heated air being introduced into all the houses on a line of street from a centrally located plant, precisely as gas and water are introduced. Pure fresh air is received through a pipe at an elevation above the surrounding houses, and this air is driven by a fan through a conduit, and over pipes filled with hot water, at such a pressure as admits of its being distributed into all the apartments of any house on the line. This heat being regulated by a register in the various rooms, the temperature can be secured as desired. Not only can this be accomplished, but, when so desired, the air can be cooled; so that in Southern climes, or during heated terms, each house on the route can be made perfectly comfortable. So much for the street or city system.



THE TIMBY SYSTEM OF HEATING AND VENTILATING.

When required for a single building, say a schoolhouse, church, or hospital, the plant can be placed in the basement, and the fresh air brought from above, driven in the same manner into all the rooms, heated or cooled as desired. When necessary, a disinfectant can be used, and a block of houses, a street, or city thoroughly fumigated in a few minutes. The adoption of the Timby system for our schoolhouses will insure to every scholar the amount of fresh air changed as required, which at present is the crying want of our educational system.

With the great progress in cooking by gas, it is not unreasonable to suppose that eventually the demand for fuel for use in