or twice a day, at most three times, will soon give most satisfactory results in health and efficiency.

We commend this matter of office exercise to the careful consideration of all employers of sedentary employes, and hope the example set by our Chicago friends will be speedily and generally followed.—*Engineering and Building Record.*

THE PROPOSED CHAIR OF ARCHITECTURE.

Editor Canadian Architect and Builder.

CANADIAN architects are pleased to be informed that it is the intention of the Minister of Education to appoint a Professor of Architecture. The reasons given are not very intelligible nor are they sufficient. That the acoustics of a hall are bad can hardly be laid to the fault of the architect, except in very rare instances. I have never heard anyone but those entirely ignorant of architecture speak as if the laws governing them were laid down on scientific principles, and could be worked to with absolute certainty. I was under the impression that beyond certain primitive rules the science of acoustics was yet in its infancy, and that it was almost impossible to determine what would be the result of certain forms and outlines in a large hall on the properties of good hearing.

However, it matters little on what ground the step toward teaching architecture is made. That it is to be taught is the main thing, and we are glad to learn it. With a better trained body of men in the profession, the really able men will have some chance of obtaining the position to which they are entitled. The general ignorance of the majority of the men who call themselves architects has done much to retard the profession and make it more difficult for the good men to do good work. The inferior men are more capable of doing work satisfactory to the average public than the better educated men, as their work being done by men nearly on the same level in art with the public is comprehensible to them; while the work of the thoroughly educated men is to them like Greek to the public school scholar, far beyond their intelligence.

Let us hope that Mr. Ross will not hurry the architectural branch too rapidly. He will be able to gain much information on the subject if he will consult those who have more knowledge of the matter than himself. It would also be well to have some understanding with the members of the profession in this country about receiving the pupils of the school in their offices after their course. That the students of the school will require to enter an architect's office for several years to gain practical knowledge will be as much a fact as it is now. No school can turn out trained men in the profession of architecture any more than a school could turn out a competent seaman and navigator.

ARCHITECT.

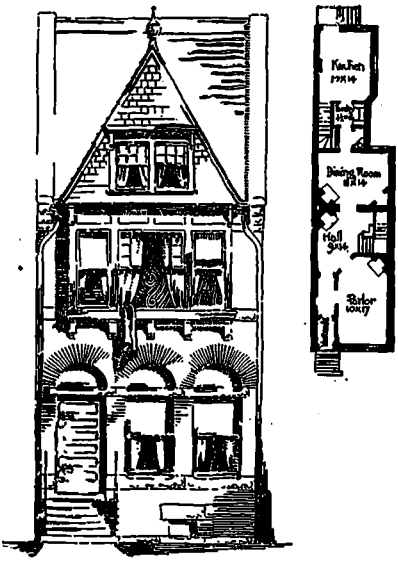
HOUSE DRAINAGE.

THE following instructive paper formed the subject of an address delivered by Mr. Phillips, of this city, to the members of the Toronto Architectural Draughtsmen's Association:

In taking up the subject of house drainage I do not intend to go into it with any degree of elaborateness from a scientific point of view, but merely to touch on its most salient points, and more especially on the construction part, and to give you some practical hints that may be useful to you in commencing your career as architects, and which will perhaps help you in your further study of the question, a question I need hardly say of the greatest importance to the architectural profession of the present day. Until recent years an architect in planning a building considered he had performed his duty to the drainage part of the plan if he put in a pipe of some shape, and usually as large possible, to carry off the water and soil from the house, and carried the pipe to a pit dug in the ground somewhere or anywhere. All he cared was to get the water and solid matter away. As to the gases, he would have laughed at any one bringing the question up. What did he know or care about the gases? But a change has taken place. An architect in the present day who does not pay special attention to the drainage part of his plan would I think be looked upon as an oddity. It behooves you therefore to make yourselves, as far as possible, thorough masters of this subject.

In planning your drainage system, four objects should be sought: 1st. All matter placed in any of the sanitary appliances in the house must be carried with the greatest possible expedition clear of the premises, leaving behind it if possible no deposits of any kind. 2nd. All sewer air must be prevented from entering the house by the channels which serve to carry away the sewerage. 3rd. As it is well nigh impossible to have house drains absolutely clean, that is devoid of all decomposing matter, all air from house drains, sink, bath, w. c. and other waste pipes, must be kept from entering the rooms. 4th. A constant current of fresh air must be established along every pipe in the drainage system, so that all gases that may be in the pipes will be rapidly diluted and carried to the outer air.

As it is not my intention, as stated before, to go into the subject too elaborately, I will take up first the pipes outside of the house; these may be of fire clay. In your specification you should call for them to be of the best, to be thoroughly salt glazed inside and out, thoroughly sound and free from all blows or other obstruction inside. In inspecting them be particular that the salt glazing is thoroughly done over all the pipe, more especially in the inside, as it is in the inside the glazing is most required, and it is there that very often the glazing is poorest done. Moreover, the contractor will be sure to try and "bluff" you on this point. Carefully pass your hand round all the inside to see if there are any obstructions or anything that will cause sediment to deposit no matter how small it may be. See that it is thoroughly sound, and upon no account pass an unsound pipe. The contractor will likely persuade you that if he turns the crack to the top side it will not do any harm. Do not believe him, as the crack will be a vent for the sewer gas, which will travel through the disturbed ground



House at 99 Wellesley St.
Knox & Elliot, Architects.

along the course of the drain, and enter the building where the drain enters the house. If you cannot be bluffed this way, he will perhaps say that he will cement it up. Do not allow this either, but throw it out. In laying the pipes see that the bottom of the trench is cut to the run of the drain, leaving only the holes for the hubs to be cut out. The failure to do this is a great cause of unequal settling, and consequent breaking of pipes after the soil has been filled in over them. In jointing them some recommend clay joints, but I would strongly recommend you always to use cement as the clay, unless the pipes are laid in a continuously damp soil, will dry and crack, leaving numerous air holes for the escape of gas. If the trench must of necessity be filled in shortly after pipes are laid, use a quick setting, but if you can leave it open for a length of time, use a slow setting cement; but whether you use quick or slow setting cement, do not on any account allow the pipes to be covered over until the cement is set with sufficient hardness to bear the gradual filling in of the earth. See that the hub joint is thoroughly filled up with the cement, and more especially on the underpart, as that is where the scamping will be tried. Also see that no cement is left projecting in the inside of the pipe. Have this taken away by the hand if you are using two feet American pipes, but if the three feet Scotch pipes are used, they are too long to use the arm, so the best plan is to use a small wooden disc cut to the diameter of the pipe. Do not under any consideration allow the pipes to be covered up till you have inspected every joint and satisfied yourself that each and every one is thoroughly made and tight. I have always made it a point myself when the drains are being laid to see every pipe laid, I consider this point so important. Of course you in your occasional inspection of a job cannot see every pipe laid, but you can inspect the outside of all the joints before giving your permission to have the trench filled in. In filling in see that all around the sides and bottom of the pipes are well and solidly packed with small stuff so that there will be the least possible chance of the pipes being disturbed from their position. In making a junction always use a Y pipe, never a square junction, and also let the junction be as near the upper side of main pipe as possible so that by the Y branch the flow of water from the branch to main pipe will be deflected as little as possible from a straight course, and by keeping it to the upper side of pipe there will be no chance of the branch pipe being air bound if the main pipe should be pretty well filled up with water. Where the pipe is taken through the wall into the building, see that the opening is made thoroughly good and tight so that no gas that may find its way along the course of the drain will enter the house. I have known where the pipes inside of a house were tested repeatedly for a leakage, but found to be all tight, and the smell was ultimately found to come in from the outside through the opening made in the wall for pipes to enter.

As to the size of fire clay drain pipes, a very prevalent mistake is to make them too large. I saw recently the plans of a block of stores which came out of an office in Toronto, and the main drain going into the street was figured at 9 inches. This pipe was intended to take the drainage of four water closets, four sinks, I think, and the rain water from the roof. The block consisted, I think, of five small stores, so you may judge of the roof surface. On calling the attention of the gentleman who showed me the plans to the large size of the drain pipes, he remarked: "Well, it will require it." I showed him that if these four water closets, etc., required a nine inch pipe, what a tremendous size the trunk sewer for such a city as Toronto would require to be.

Speaking of trunk sewers, let me give you the result of the difference found in experiments between the old time practice and the generally adopted present day practice. An old sewer with a superficial area of 17 feet was tested as to the rapidity of its flow, and its consequent ability to carry away all impurities and obstructions, and in a 100 feet portion of it was laid a 12 inch diameter pipe. All the water in sewer was deflected. Well, on a brick being laid in bed of sewer, no impression was made on it by the force of water, but immediately on its being laid in the 12 inch pipe the force of water whisked it away, and not only carried it through the whole length of the pipe, but a number of feet beyond, proving conclusively that the more you can compress the water, the more certainly will impurities be carried off.

But it may be said that pipes that would ordinarily be large enough to carry away drainage of buildings, will not be large enough to carry the water away say at the time of a heavy rain storm. There is a percentage of truth in this, but an exceedingly small percentage. To show this, let me give you the case of a 12 inch street pipe sewer with a large number of branch drains delivering into it, the sum of their cross sections being equal to a circle 30 feet in diameter. This 12 inch pipe on ordinary occasions ran about a third full, but during a heavy rain storm covering the whole area of ground drained by these branches, in creased the bulk to only two thirds full, but increased enormously in the rapidity of its flow. An experiment was made with a 6 inch pipe 100 feet long, the upper end of which was laid in a creek with its mouth entirely covered with the water, so that the water at the commencement of its flow entirely filled the bore of the pipe. On examining the outlet of the pipe, one would fancy that as the water on entering was always keeping the pipe full, the same head of water would come out at the lower end, but instead of that it filled only 2 inches of the diameter of the pipe. Another case was that of a public building with something over 100 sinks, closets, water spouts, &c., and having a large drain 2'-6" diameter which was repeatedly examined, and its largest flow at its outlet was only equal to a sectional area of 5 inches showing that a 3 inch pipe would have been more than large enough to carry the sewage. It has been calculated that a 6 inch pipe will carry the ordinary drainage of a district with 1000 inhabitants.

Taking these facts into consideration, I would advocate that where you can have a good fall, say a half to a foot, that a four inch pipe should be used, and on no account should a larger pipe than 6 inches be used for almost any ordinary building.