on reinforced concrete buildings.

The hoisting bucket and the concrete mixer shown, have the same batch capacity. The mixer discharges its full batch into bucket, which is then hoisted and discharged automatically into the concrete bin at any desired point. The concrete can then be drawn from this bin as needed. The hoisting bucket is loose in its hoisting frame and is free to swing about its lowest point. The nose of the bucket rides against a 2x6 runner, which prevents dumping until the bucket reaches end of board.

All the labor in wheeling the concrete from mixer to material elevator and in bringing the empty barrows back to the mixer is thus done away with. The ordinary way of hoisting the concrete, one wheelbarrow at a time, chokes down the capacity of the mixer, for the amount of concrete mixed depends necessarily upon the rapidity with which it is hoisted. In the hoisting outfit illustrated the output from the mixer is limited only by the speed of the wheelbarrow men in taking concrete away from the bin.

On the Dominion Engineering & Construction Company's contracts throughout the Ransome concrete mixers and the Ransome outfits are used successfully.

The American Tobacco Company's new factory in Montreal is nearing completion, and is a beautiful example of reinforced concrete construction. Mr. H. F. Haas is superintendent on this contract, and under his supervision great progress is shown each day.

## THE CONSTRUCTION OF THE DETROIT TUNNEL.

The contract for the construction of the Detroit River double-tube tunnel of the Michigan Central has been awarded by the Detroit River Tunnel Company to Butler Bros.-Hoff Company, of New York city. The contract calls for the completion of the tunnel by June 1, 1909, and the work is already under way. As the tunnel will be built according to a modification of the design suggested by Mr. Wilgus, vice-president of the New York Central, and head of the advisory board, which design involves a new departure in subaqueous tunneling methods, further details of the final, modified plan are here presented.

The design of Mr. Wilgus is a trench method. In accordance with the plan, before sections of the steel tunnel tubes are floated into place, and immediately after the dredging for the section has been completed, piles are to be driven in the bottom of the dredged channel and cut off at the proper height (or an inch or so below, to permit shimming). These piles are to be capped with steel beams to receive the tubes. When the piles are driven, the bottom of the channel to the level of the top of the beams is to be filled with a layer of material of suitable consistency and bearing power, for twelve to eighteen inches in thickness, or as much more as may be necessary to fill in holes or depressions left in the bottom of the trench by the dredging operations. This layer will form a blanket between the bottom of the trench and the concrete to be deposited around the steel tubes. For this layer, sand and gravel will be used, with the addition of cement where necessary.

In the trench and upon the steel beams and bed of gravel and concrete will be sunk tubes of plate steel ⅜-inch thick, and weighing an average of 15.3 pounds per square foot. The steel tubes will be built in lengths of 263 feet, or in such lengths as are found most convenient to handle. The plates will be lap-jointed with a double row of ¾-inch diameter rivets, the outside edges being beveled and caulked so as to be absolutely water-tight. The steel tubes are to be reinforced on the outside, about every twelve feet, by diaphragms, which will serve the purpose of a cradle in sinking the tubes to their permanent position. On the inside, midway between the diaphragms, the tubes are to be reinforced with a stiffened angle, to which will be attached temporarily, radial rods of one-inch diameter, though these rods may be dispensed with if it shall be found that they are not needed. The ends of the tubes are to be reinforced with similar radial rods, to prevent deformation during handling. The steel in the tubes is to be of the grade of "railway bridge steel," with an ultimate tensile strength of 55,000 to 65,000 pounds per square inch.

The tubes will be sunk separately or in pairs, from scows properly anchored for the purpose, or from temporary platforms, supported on piling. The greatest care will be exercised to see that they are not overstrained in the handling, so as to cause leaks in the joints. When in position to be sunk, the tubes will be lowered in a slow and careful manner, so as always to be in complete control. The piles in the trench will always be in such positions that one of the diaphragms of the tube will rest upon the beam when the tubes are in place. Each tube, or pair of tubes, is to be provided with a detachable upright at each end, firmly braced to the tube, and of sufficient length to indicate the position of the tube when sinking. These uprights will also serve the purpose after the tube is sunk to adjust its position laterally, so as to bring the sections into alignment. The uprights will, therefore, extend ten feet above the water, after the tube is in position. When the tubes are concreted in, these uprights will be removed and used again. When the tubes are adjusted laterally to their correct position, divers will examine all bearing of the tubes on the beams in the bottom of the trench, and will insert shim plates of proper thickness to produce exact bearings.

Each tube when manufactured will be fitted with a sleeve at one end which can slip over the end of the adjoining tube previously sunk. The sleeve is to be provided with a flange of the adjoining tube, a rubber gasket being placed between the two. A similar rubber gasket is to be provided at the inner end of the sleeve bearing up against the edge of the next tube. In bolting up the flanges, which must be done by divers, the rubber gaskets must be squeezed together between the ends of the tubes to form a tight joint. A space three inches by eighteen inches is thus formed all around the tube at the joint. This space will be filled with a grout of pure cement. To this end each sleeve will be provided on top with two small pipes (flexible pipes and joints,) leading to the scow floating above. With a force pump each joint will be tested to ascertain whether it is tight by closing one pipe and forcing water through the other. When the joint has been made reasonably tight pure cement grout will be pumped into it through one pipe until it comes out through the other as evidence that it is completely filled.

In order to assist in making an exact connection between the tubes each tube will be provided with two pilot pins with taper points that fit into bell-shaped sockets fastened to the adjoining tube. Ween the tubes are sunk and pulled into place these pilot pins will guide the tube to its exact position for connecting up. Before each tube or set of tubes is launched the corresponding end of the next tube will be fabricated and all flanges, rubber gaskets, bolts and pilot pins with sockets, fitted together, so that when connected up they will fit accurately.

The ends of the tubes at the joints are further to be fitted with flange angles on the inside for the purpose of caulking between them should the joints be found to leak. These flange angles are then to be connected with bolts drawn up tight and a suitable caulking material forced in between such angles to make the joint tight. These angles will not be connected where the joints are found tight and acceptable.

A wooden form is to be bolted to the outer flanges of the diaphragms of each pair of tubes in order to confine the concrete deposit around the latter. This form is to consist of rough planks of yellow pine, white pine, spruce or other timber, three inches in thickness and eight to twelve inches in width securely bolted to the flanges of the dia-