Plant Inspection.—During the progress of the work additional quantities of raw materials will from time to time be delivered to the contractor's plant. These should be sampled and examined in the manner previously described for the preliminary inspection of raw materials and no deliveries should be used in construction work until after they have been examined and tested and found to be in accordance with the requirements of the specifications. Owing to delays in the arrival of shipments this may at times be difficult, if not impossible, but in such cases, if it is inadvisable to shut down the work temporarily, the inspector should make all the tests possible at the plant in order to convince himself that the materials are suitable for the work. If he is able to determine definitely that they are unsuitable, they should, of course, be rejected and work shut down until other suitable material is available. At times it may be necessary for him to assume the responsibility of passing the materials and permitting their use pending an authoritative report from the central testing laboratory. Sometimes there will be but little risk in doing this; under other circumstances it may be advisable to permit the contractor to proceed with his work with the distinct understanding that if the materials are found not to comply with the requirements of the specifications he will take it up. Such an arrangement should only be made in writing and with the consent of the resident or supervising engineer. Where sand is delivered by wagonload, it will usually be sufficient to take an average sample of the day's deliveries and test it. Where the sand is delivered by rail or barge, the contents of each car or barge should be tested, if possible before unloading it. These instructions apply also to stone and gravel. It is so extremely important that deliveries of various grades of stone, sand and gravel should be kept separate that the speaker again wishes to emphasize this point.

Generally speaking, the processes involved in the manufacture at the plant of bituminous paving material are:—

Preliminary mixing and heating of the mineral aggregate.

Preparation and heating of the asphalt cement or bituminous binder.

Mixing of the heated mineral aggregate with the hot asphalt cement or bituminous binder.

Preliminary Mixing and Heating of the Mineral Aggregate.—The proportions in which the various constituents of the mineral aggregate are to be mixed will, of course, depend upon their character and the specifications under which the work is being carried on. The method of mixing the different ingredients depends somewhat upon the feeding arrangements at the plant and the disposition of the raw materials. In certain large plants the raw materials are stored in bins. In some instances these bins have automatic feeding devices which deliver the contents of the bins upon a conveyer belt. In such cases the automatic delivery devices should be set at the proper points and during their operation should be watched from time to time in order to see that they are delivering the desired quantity of material. With certain mixtures a mere inspection of the mixed aggregate as it is being fed to the heating drums will enable the inspector to roughly determine whether or not the proportions are being adhered to. With other types of mixtures this is very difficult to regulate by observation at this point. In the majority of instances, plants are not provided with storage bins of the type previously described and the materials are dumped in piles on the ground. These piles are usually arranged so that the material from them can be easily conveyed to the feeding device for the heating drums by means of wheelbarrows or horse slips. Where the mixture consists of sand and stone of various sizes, with a considerable proportion of stone, it is advisable to have the mixture made in a pile adjacent to the feeding device. This can frequently be done satisfactorily by having the requisite number of wheelbarrowfuls of the various ingredients dumped on a certain spot, this pile to be roughly mixed by shovels and then shovelled over into the feeding device. Where a simple mixing of two grades of sand is required, this can frequently be done satisfactorily by building a small box or boot around the bottom of the cold sand elevator and having the fine sand placed on one side and the coarse sand on the other side. One man on each of the two sand piles can then shovel the material into the box above mentioned in accordance with the mixing formula determined upon. Assuming that two parts of coarse sand were required to one part of fine sand, the man on the coarse sand pile would have to throw two shovelfuls of sand into the box to every one shovelful thrown by the man on the fine sand pile. The feeding of the sand thus thrown into the box would be attended to by a third man, who would feed it to the buckets of the elevator by means of a hoe or shovel. Usually the fireman who is in charge of the firing of the heating drums is able to supervise the operation of the feeding gang and see that they feed a properly proportioned mineral aggregate. In mixtures of sand and large sized stone there is liable to be a certain amount of segregation of the material in its passage through the heating drums. Certain plants are provided with an overheat screen to separate the heated material after is comes from the drums into the various sizes and distribute them into different bins. The material contained in these bins is then drawn out into the measuring box in definite proportions according to weight. This, of course, is the most accurate method of making mixtures involving the use of a large proportion of relatively coarse stone.

The function of the heating drums is to dry and heat the mineral aggregate. Unless ample air circulation is provided for to carry off the moisture in the shape of steam, the drying will not be effectively conducted. It is essential to regulate the rate of feed and the temperature of the heating drums so that the mineral aggregate delivered from them will be dry and at the proper temperature. This operation is usually in charge of the fireman for the heating drums. The most modern plants are provided with a pyrometer inserted in the delivery chute from the heating drums. This pyrometer has a plain or recording dial which is placed at the feeding end of the drums, where it is under the observation of the drum fireman. This makes it easy for him to regulate his fires and the rate of feeding necessary to secure the desired results. Where no pyrometer is inserted, it is necessary for him to test the temperature of the material issuing from the delivery end of the hot sand drums from time to time, as often as may be required in order to produce satisfactory results. It is a comparatively simple matter to take the temperature of heated sand, but where the mineral aggregate consists of large stone particles, it is a much more difficult and unsatisfactory operation. Certain types of mixing plants are so constructed that it is very difficult to obtain samples of the hot mineral aggregate before it is mixed with the asphalt cement or bituminous binder. Regardless of the difficulty involved, it is good practice to test the temperature of every batch of mineral aggregate in plants of this type before it is mixed with the asphalt cement; otherwise regular work cannot be expected. Even when the greatest care pos-