a little phased at attempting to heat one end and not have any interference from the other end. We, however, conceived the idea that there could be a partition put across the middle of the building about 12 ft. high, and we could then bring the heated air down to the zone which it was desired to heat, which was not over 8 ft. above the floor, and in that way we could perhaps confine the air in the space, and not have very much effect on the rest of the building. It was something of a speculation and rather a bold attempt, when you consider entering into a guarantee which might involve a serious loss; nevertheless it was done.

"The apparatus is arranged under the landing platforms of the gallery which surrounds the shop, so that it is out of the way of the cranes. Pipes are carried along beneath the runway of the cranes, and branches are brought down on the posts and discharge the air towards the floor, the outlet being in the form of a Y, which is adjustable.

"We were very much gratified after the plant was started to find that it performed just as was expected it would, and it is surprising to note the difference in temperature between the two sides of that partition; it is almost the same as when you pass from the building out of doors. The result is simply due to the fact that the air was brought down and continually pressed down into the space which it was desired to heat."

Further emphasizing the advantages of correct distribution, Mr. Gifford says that it is "possible in some cases to introduce $50 worth of additional pipe to carry the air where it is most needed, so that you can, on account of this, leave out $100 worth of heating apparatus. That is, you can get equal results by using smaller apparatus and less steam."

The adoption of the fan system renders the control of the heating apparatus and of the ventilation ideal. During very cold weather, or in the morning, when the building is being heated up, the air supply may be drawn from within the building itself, thus effecting a great economy of heat. In some buildings having a very high cubic space per occupant, sufficient ventilation during the winter time will be supplied by the leakage of air through doors and crevices about the windows, by transfusion, etc. Quoting Mr. E. T. Child, also of the Sturtevant Co., some of these advantages are as follows:

"First, a great convenience in handling, since the entire heating-system of a building may be controlled from one point. Second, efficiency and economy, by controlling the speed of the fan and reducing the length of pipe to which steam is supplied, leaving more steam available for other purposes. Third, the fact that the entire heater coil is in a steel housing makes the danger from fire much less than with many pipes passing through partitions of wood. Fourth, in the summer time it gives the opportunity to ventilate the shops. This, I think, is quite important. Some shops are very apt to become overheated in the summer time and a current of cold air may be drawn from a basement, making them much more habitable.

"The pipes should be so arranged that the air will not be discharged directly upon the workmen; it is also true that hot air will do the most good if it is put where it is needed. If the space around the walls of a building is properly heated, one may never worry about the centre, as that will keep warm.

"We have found, therefore, the most satisfactory heating will result from numerous pipes discharging on the outside walls at a point about 6 ft. to 8 ft. above, and directed towards the floor. These pipes should be located from 25 ft. to 40 ft. apart, depending upon the character of the building. This arrangement causes hot air to be blown downward, whence it spreads on the floor, keeping it warm before the air has a chance to follow its natural tendency and ascend to the roof. Hot air has a very bad faculty of getting up in the trusses and if you blow the air directly at the floor and get the floor warm, at the same time keeping the outside of the building warm, your problem is practically solved. In the case of an underground duct, it is well to use short outlet pieces which will discharge the air along the walls at the floor.

"At the works of the Fore River Ship & Engine Building Co. they have an overhead pipe system with drops on the walls, which was put in according to the regular practice. Later they added 50 per cent. to the building and are now heating it with the same apparatus. That is, we picked out a fan heater which we considered to be the proper size for that particular building and it worked in a perfectly satisfactory manner. Later the ship company added 50 per cent. to the length of the building. We extended the piping and carried drops on the walls every 30 ft., blew the air on the floor with ample outlets on the ends, and in the coldest weather the heat of the building, which is 50 per cent. larger than we would care to guarantee with our apparatus, was perfectly satisfactory to them. Their success is entirely attributed to the excellent system of air distribution.

"At the shops of the Atchison, Topeka & Sante Fe Ry. Co. the underground system was adopted and low horizontal outlets were provided which distribute the air at the floor and along the walls. This is an extremely large shop, the contents being about four or five million cubic feet. The shop is heated by four large apparatuses and the underground ducts extend almost entirely around the building. The pipes are not over three feet high, the air being discharged horizontally along the floor, and I understand that the building is very satisfactorily heated.

"The galvanized iron pipe system with drop pipes on the walls has been used at the new shops of the New York, New Haven & Hartford R. R., at Readville, Mass., and with excellent results.

"The following general classification of railway shops may be made: First, machine, erecting and car shops; second, paint shops; third, round houses.

"The second and third require special treatment. Paint shops require to be practically dustless and, consequently, the air velocities must be low. The temperature requires to be higher, and it is customary to arrange to circulate the air in a much more thorough manner than in shops of the first class.

"This is done in the Pennsylvania railroad shops at Altoona by means of ducts and in the New Haven shops, Readville, by a similar overhead system. There has been a great deal of hesitation among railway men about installing the hot-blast apparatus in paint shops. They are afraid of getting their varnish dusty. But I might name a dozen or so paint shops all over the country, for instance, the Boston & Albany shops at Allston, the New Haven shops at Readville, and there are several Western shops, all of which are heated with the hot-blast system, by a very ample distribution of air. The circulation is brought about by a counter-exhaust system, which circulates the air, returning the whole or a part of the apparatus. There are two ways of establishing this return of the air; one by an underground duct system and the other by an overhead galvanized system. In the Pennsylvania railroad shops at Altoona, we have an installation that has been in a dozen years, I think it is one of the first we put in that returned the air from underground and back to the fans, using very ample distribution of air-pipe in the discharge.

"In the Readville shops the air is brought back by means of an overhead galvanized pipe. In this way circulation is kept up in all parts of the room, and thereby the paint is dried much more rapidly than it would be by any other system where the air in the room is practically still.

"Round houses have been much neglected up to recent years, but of late they have been receiving better attention. Their proper heating is a problem of no little moment.

"The hot-blast system of heating is a great improvement over the old method, since it allows for ventilation in the winter time with both windows and doors closed. In this class of buildings the air should be delivered through ducts which terminate in the walls of the pit, thus delivering the air where it will be most effective for thawing out engines that have come into the house covered with snow and ice. At the same time it is a very good idea to have a provision for admitting some of the air above the floor in case there are no locomotives which need special attention.

"A little official comment on this subject may be interesting. The following clippings are culled from the Pro-