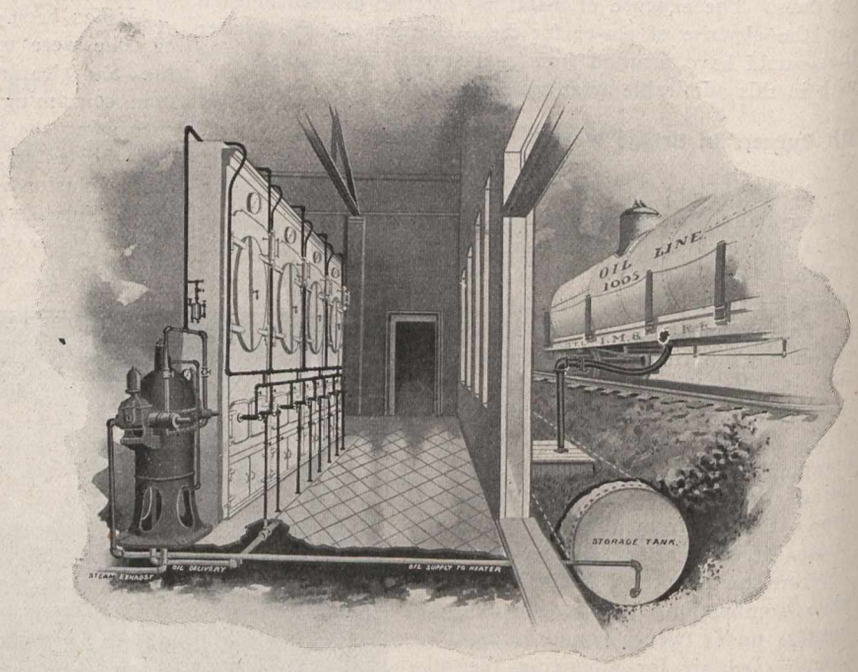
in one hour. It seems to be a reasonable conclusion that the day is past when 1¼ hours were required to heat up six 100 lb. billets and further, that the oil burning furnace is making an enviable reputation for forge shops.

Steam Generation by Oil Fuel.

Starting the Fire.—Since the oil must be atomized, the initial starting of the fire requires either a supply of compressed air to turn into the atomizing nozzle until steam pressure has been attained (when it is switched off to steam by a three-way-cock) or else a small boiler must be kept as an auxiliary. This disadvantage is made up for in the fact that by starting the oil and throwing some oil-soaked waste into the fire box, the fire is instantly in full blast; this has been found to be a great time saver in the long run, for plants that close down entirely.

Kind of Oil to Use.—Oil with a free test of 180 to 200 degrees Fahr. is considered as safe as coal, which latter has been known to ignite of spontaneous combustion. If oil with a test of 250 or 300 degrees is stirred with a red hot poker, it will not ignite, and even a shovel full of hot coals thrown on its surface, will immediately sink and be extinguished. Crude petroleum or fuel oil is the commercial name.

Storage and Temperature of Oil.—The oil is best stored when convenience and safety are both considered, in an underground tank between the R.R. track and the boiler room. The most successful result is obtained when the oil fed to the burners under constant pressure is strained and heated before fed to the furnace. Tate, Jones & Company, Inc., of Pittsburg, Pa., have covered these points well in their various bulletins on this and other subjects, and the author recommends that those interested can get fuller information from the manufacturer in regard to their fuel oil pumping, heating and pressure regulating systems for both stationary, marine and metallurgical work. It might be mentioned here, however, that the piping into the breeching of the boilers is frequently so arranged that a considerable rise of temperature is obtained by the time the oil reaches the nozzle—sometimes as high as 200 degrees Fahr.



Sectional Elevation of Steam Plant, Showing Method of Outfit. Applying Oil Burners and Best Location of Storage Tanks and Pumping

Importance of Atomization.—As is the case with any fuel, oil must be thoroughly mixed with air in order to secure complete combustion and no smoke from the stack. If the spray of oil contains some small and some large particles of oil, the larger particles being supplied no more air than the small ones, will not be burned, and the result will be a coating on the boiler tubes which is more difficult to remove than the soot deposited from a coal fire. This difficulty, however, has finally been entirely overcome by the latest design of nozzles, which give a steady fire and no smoke. In the Texas oil fields where oil is especially cheap, and in California where oil is especially dear, the results of a tour of inspection will convince anyone of the fact that burners have been obtained which are most efficient and satisfactory. The old time explosions which occurred now and then were due to the fact that the oil dripped down and later evaporated till the mixture with air became explosive. This danger has been proved a dead issue, since many of the insurance companies are giving the same rate for those using oil as a fuel, as for those using coal. Frequent tests with open flame, of boiler pits, and many months of successful operation have convinced the most sceptical that oil burners for steam boilers are practical, safe and convenient attachments even as auxiliary equipment. The best comparison to be made between oil burners of the present and of the past, is the comparison between the Welsbach gas lamps of the present, that thoroughly mix the gas with the air, and the obsolete open tip which is both inefficient and filthy.

Triple Use of Oil Burners in Steam Mills.

Oil burners can be and are being employed in some of the greatest and most progressive steel mills in the country, in three capacities:—

(1) To heat the open hearth furnaces regularly.

(2) To serve as auxiliary where gas is used.

(3) To heat the ladles and prevent explosions and consequent loss.

For Continuous Use.—In the open hearth process there has been proved a saving by the introduction of oil burners. This saving is made up by the following items, as gathered from talks with users:—

(a) A lower grade of scrap, or a greater per cent. of scrap can be used since oil is comparatively free from phosphorus and sulphur.

(b) Since the highest temperature of the oil flame is at the bottom it follows that it is directly applied to the "bath" and not to the walls, arches and doors of the furnace. It is the enthusiastic opinion of users that shutdowns for repairs to doors and brick-work are much less frequent. So much so that a run of 840 heats was made at the General Electric Company. The Midvale Steel Company and others report extremely satisfactory results also.

(c) Owing to accurate control, the furnace can be banked for two or three days and then heated full blast in twelve to sixteen hours, a thing impossible to do with a gas furnace.

(d) Small first cost as compared with producer gas systems.

(e) Large saving in labor, since furnace attendants can take care of oil burner while large corps of men is needed to operate producer gas plants of any considerable size.

(f) Efficiency has been as high as thirty-eight gallons oil per net ton of charge.

As Auxiliary Equipment.—The oil burner is made hinged so that it can be swung out of action until such time as the regular fuel supply might happen to fail. Thus it is ready at a moment's notice and the heat of the bath and walls instantly brings the flame to an efficient state.