THE NEW STEAM TURBINE POWER PLANT OF THE KERR MILLS OF THE AMERICAN THREAD CO., FALL RIVER, MASS.

In the early part of 1907 the American Thread Company decided to make an addition to their plant at Fall River. The old plant consisted of a spinning and twisting mill, dye and gassing house. The power for the main mill was derived from a double tandem-compound engine of about 1,600 indicated horse-power; and the dye and and gassing houses were driven by small engines, the power from these and the main engine being distributed throughout the various mills by belts and shafting.

It was decided to drive the new mill electrically, principally on account of the probability that, as the business increased, various additions would have to be made, and the electrical drive lends itself particularly well to this end. The building of the new plant necessitated the complete rearrangement of the machinery in the old main mill.

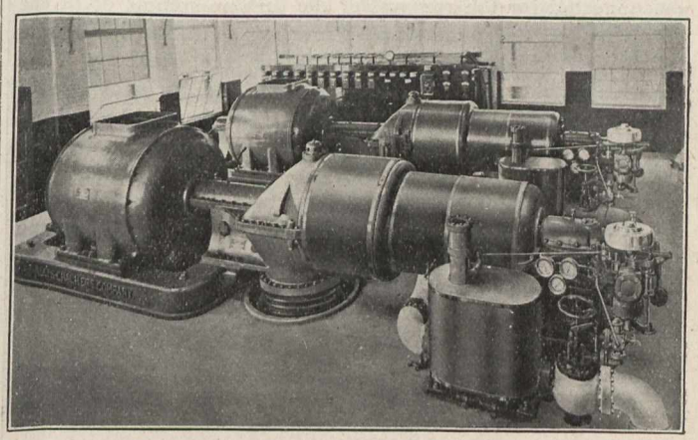
It was first proposed to merely make a new arrangement of the shafts and belts, and at some future time, when it became necessary to install a new engine, to change to electrical drive. An accident, which might have had serious results, occurred to the main engine before this plan had been carried out, which decided the management to abandon the engine and immediately install electric drive, not only in the new mill, but in the old mill as well. The new power house, described in this article, was, therefore, designed to furnish power for the complete plant, and is arranged so that it can be conveniently enlarged to care for future power requirements.

The power house is located on South Watuppa Pond. The tracks of the New York, New Haven and Hartford railroad run between the power house and the pond, cutting off a small body of water from the main pond. Connection was made with the main pond at two points, the water being brought into the power house through one of these connections and a trench, and the water from the condensers flowing into the small pond and thence under the railroad, through the other connection, into the main pond. These connections were placed some distance apart so that the used water would have no tendency to return to the power house.

The power house building consists of a turbine room, 43 ft. by 56 ft. and a boiler-room 58 ft. by 132 ft. The building is of brick, with concrete floors and roofs.

The boiler-room contains twelve horizontal tubular boilers, built by the Bigelow Co., of New Haven, Conn., each rated at 200 horse-power. Those boilers are hung from beam supports and are brick set, the setting being arranged so that superheaters can be installed in the rear end of the setting. Three Foster superheaters have been installed for the purpose of testing their durability and efficiency. The gases from each battery of six boilers pass through a flue to a green fuel economizer, and thence to the chimney. The flue back of each battery is arranged so that the gases can either pass to the chimney or through the economizers. All of the boilers are arranged for burning low grades of fuel, and are equipped with "Parson" blowers and arrangement of setting. A Warron Webster open feed-water heater and purifier is located at the end of the boiler-room, next to the turbine room. Two skylights are placed in the roof of the boiler-room, one over the firing space and one over the tops of the boilers. The wall opposite the front of the boilers and back of the firing space is made of galvanized iron, as any future addition to this boiler-room will be a duplication of the present layout, the new boilers facing the present ones. The boiler-room floor is level with the yard. Coal will be brought from the storage piles by a conveyor system and dropped in front of the boilers. The steam piping is arranged so that superheated or saturated steam can be supplied to the turbines or to the auxiliaries, either separately or in conjunction. This arrangement was made primarily for use in testing the efficiency of the different types of apparatus. The feed water is delivered to the open heater and purifier and is then pumped to the boilers. The feed-water main is of cast-iron, and so arranged that water can be supplied either from the pond or from the heater and purifier and delivered directly to the boilers or through the economizer. The drips from all of the high-pressure steam mains are collected at one point, and from there returned to the boilers by a Holly return system. The turbine room has two floors, but the upper floor, where the turbines are located, does not extend over the space occupied by the pumps. This space was left open so that the travelling crane, which is of ten tons capacity, and was built by the Northern Engineering Co., could be utilized in installing and repairing the auxiliaries as well as the turbines. The turbine room contains two 1,500 kw. Allis-Chalmers A.C. turbo-generators, two General Electric 75 kw. D.C. turbo-generator exciters, and a General Electric switchboard. This apparatus is located upon the upper floor level.

Incorporated in the main turbines are the various patented features controlled by the builders, Allis-Chalmers Company, among which may be mentioned channel-shaped shrouds protecting the ends of the blading from injury, machine-cut slots in the foundation rings insuring accurate spacing of the blades, a method of fastening the latter which effectually prevents them from working loose, and improved



Two 1,500 k.w. Allis-Chalmers Steam Turbines and Generators.

balance pistons. Other details of special interest will be mentioned briefly under the subjects to which they belong.

The turbines operate at 1,800 revolutions per minute, with a steam pressure of 150 pounds at the throttle, dry saturated, and a vacuum of 28 in. of mercury referred to 30 in. barometer at the exhaust nozzle. Large temporary overload capacity has been provided for in the design of these machines; high efficiency is maintained and close regulation secured, even under the most unfavorable operating conditions. The bedplate is divided into two parts, one carrying the low-pressure end of the turbine. The turbine is secured to the former, while the latter is provided with guides, which permit the end of the turbine to slide back and forth with differences of expansion caused by varying temperature, at the same time maintaining the alignment. The "Bulkley" condensers are located outside the building. The speed of each turbine is regulated within close limits by a governor driven from the shaft through cut gears working in an oil bath. This governor, by means of a relay, operates a balanced throttle valve. The entire mechanism is so proportioned as to respond at once to variation of load, but its sensitiveness is kept within such bounds as to secure the best results in the parallel operation of the two turbo-generators in this station. The governors can be adjusted for speed while the turbines are running, thereby facilitating the synchronizing of the generators and dividing the load as may be desired. In order to provide for any possible accidental derangement of the main governing mechanism there is an entirely separate safety or over-speed governor. This governor is driven directly by the turbine shaft without the intervention of gearing, and is so arranged and adjusted that if the turbines should reach a predetermined speed above that for which the main governor is set the safety governor will come into action and trip a valve, shutting off the steam and stopping the