13. Reinforced-concrete framing is frequently employed, though the roofs are generally of wood and covered with tar and gravel. The use of exposed iron or steel in roof construction is generally avoided because of the rapid corrosion. The pits are connected at the inner ends by a drain from which the water escapes through an outlet sewer emptying into a large catch basin, or sump, where the sediment is deposited.

14. The pits in this case are recessed for steam-pipes, though the use of fan blast for heating engine houses is becoming more and more general, and it is usually found that better results are obtained by the use of vitrified tile ducts laid underground and discharged into the sides of the pits



Fig. 4.-100,000 Cal. Steel Water Tanks.

than by the use of galvanized pipes above ground, which generally need frequent renewal. An important advantage of the fan blast is that it assists in ventilating the house, changing the air in from eight to thirty minutes, as usually installed and operated.

15. There are a great variety of smoke jacks in use. The type which seems to be coming into favor is conical in shape and is frequently made of wood, lined with sheet asbestos or similar material. Smoke jacks are generally provided with dampers in houses where fan heat is used, and a space is sometimes left open around the jack for assisting in ventilation.

16. The satisfactory lighting of engine houses is a difficult problem. Oil, gas and electricity are commonly used. Incandescent lamps do very well if kept clean, and have the advantage of portability, separate circuits being frequently provided for extension cords, so that light may be carried to any point where it is needed.

17. Floors of vitrified or paving brick, crowned sufficiently to drain to the pits, have been found very satisfactory.

18. Drop pits for the removal of driving and truck wheels are very convenient. They are frequently made to span three tracks and of width sufficient to take the largest wheel handled. The jacks used in these pits are generally mounted on carriages, running on rails laid in the pits, and they are usually operated by air or water, though screw jacks are sometimes used. Hydraulic jacks are usually considered preferable to air jacks because of their more positive action. Cranes are generally provided over drop pits.

action. Cranes are generally provided over drop pits. 19. The shop facilities necessary at the engine house depend upon the distance from large repair shops. Generally speaking, the tool equipment should be sufficient to take care of running repairs, though if the house is located near a repair shop some of the machinery that would otherwise be necessary may be dispensed with. There should also be a tool room, conveniently located with respect to the ma-

chine shop and engine house, in which small tools of all kinds can be conveniently kept and drawn as required. The storehouse should be similarly located and should carry **a** sufficient amount of material to handle the repairs frequently necessary.

20. There is nothing of particular interest to be said about the power plant of the average engine house. Boilers, engines and other equipment may be of any type desired. It seems to be the custom to figure on about ten boiler horsepower per stall and, on account of the common use of air tools, a compressor capacity of about 20 cu. ft. of free air per minute per stall is usually provided.

21. Oil houses are generally of fireproof construction, with the oil stored in a separate room from the place of distribution, from which it is drawn or pumped from tanks as required. The oil is usually stored in tanks in the basement. the size and number of the tanks depending upon the amount and variety of oils used. Self-measuring pumps are extensively used in modern installations.

22. Of recent years there has been considerable demand for better and quicker methods of boiler washing, and as a result several systems have been introduced. One of the earlier arrangements consists of an open cistern of perhaps 100,000-gal. capacity, located near the engine house. In this the steam blown off from locomotives is used for heating water to wash out the boiler, and in some cases also for heating fresh water with which to refill it. Recent installations are the National, which is of the closed-heater type, in which the steam and water blown off are used for washing out and for heating fresh water; and the Raymer system, which is of the enclosed-heater type and performs similar functions. Blowing-off, washing and filling connections are generally provided between alternate stalls in the engine house

23. Locker rooms are generally provided for engine men, and fitted with a sufficient number of expanded metal lockers to accommodate their clothing and small tools. These are located in a building near the engine house office. Lockers are also provided for shop men, and are frequently located



Fig. 5.-Half Section of Elevation Cinder Pit.

inside the engine house on the walls of the building. The lockers are generally made of sheet steel with openings for ventilation. At points where boarding and lodging houses are not conveniently accessible, bunkhouses are frequently provided for the accommodation of the enginemen. These are usually provided with toilet rooms, shower baths, etc.

The Engine House Organization.

24. The details of handling engines vary greatly on different roads. It seems to be generally customary, however, to have the engineer relieved at the coaling station by an hostler, though at some plants inspection pits are encountered before the engine reaches the coaling station, and the engineer is relieved at those points. In some cases also the cinder pits are reached before the coaling station, though it is generally considered better practice to have the cinder pits next to the engine house, so that if the fire is dumped

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