

tween the jetties deposits of hardpan were met with; but the rotary cutter of the hydraulic dredger found no particular difficulty in breaking into this material. The hydraulic dredger used in late years measures 120 by 40 feet, with engines of 400 horse power and with a suction and discharge pipe 20 inches in diameter. Depending upon the character of material, its capacity ranges from 1,000 to 5,000 cubic yards per day.

On the east side of San Francisco Bay the shallows extend from the shore line fully two miles. Upon this flat the currents from the rivers discharging into the bay are driven by prevailing westerly winds. In time of flood, these river waters are full of sediment, which is deposited when the comparatively calm areas of the lower bay are reached. The ferry landings on the east shore are of

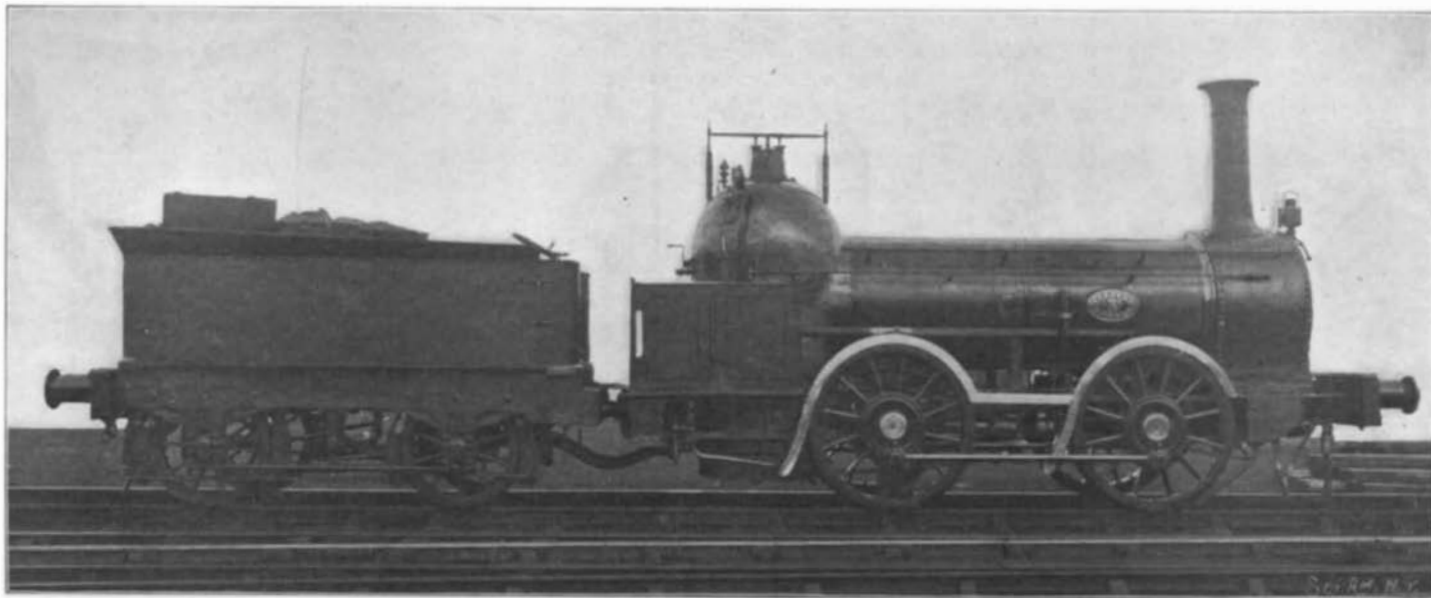
great length. The Oakland pier is fully two miles in length, and the one at Alameda nearly twice as long. Both are of pile work, which suffers terribly from the destructive ravages of the teredo. Gradual progress has been made in filling in the trestles, especially on the Alameda pier, which runs directly on one side of the new channel. The material for filling is obtained by dredging from the estuary and utilized for making a solid roadbed for the railroad tracks. A space 9,000 feet long and 150 wide to a depth of 10 feet was recently filled in this way. A bulkhead was built on each side of the track, and into this space a pipe 20 inches in diameter, extending from the dredger, 5,700 feet distant, and supported by pontoons and piles, discharged a continuous stream of gravel and water, until the present solid roadbed of solid material was formed. The Oakland Harbor improvement has proved of even greater value than anticipated. The works are in charge of Col. H. E. Heuer, of the U. S. Corps of Engineers.

CURIOUS LOCOMOTIVE EXPLOSION.

The accompanying illustrations are reproduced from photographs of an unusual railroad wreck which occurred to a local passenger train on the Denver & Rio Grande Railway, between La Veta and Cuchara, Colo. The disaster was due to the rupture of the boiler at the junction of the barrel and the firebox. The train consisted of a locomotive, ten freight cars, and a passenger coach at the rear, in which were some twenty-five passengers. The explosion occurred when the train was about one mile distant from La Veta station. The engineer and the fireman were instantly killed, and the concussion was so violent that buildings a mile distant from the track were severely shaken, and the noise of the explosion was heard at points twenty miles away, where it was supposed that an exceptionally heavy mining blast had been set off. The body of the engineer was found between 500 and 600 feet distant from the track and mutilated beyond recognition. The engine, as will be seen from the illustration, was completely wrecked. The upper sheet of the firebox was torn entirely loose from the boiler, and thrown a distance of over 600 feet to the right, landing on ground which was about 50 feet above the level of the track. The force of the explosion was sufficient to strip the boiler entirely from its seating, and the barrel was driven forward with a rocket-like action along the ground, plowing a deep furrow at the left of the track for a distance of 125 feet. The blast was also sufficient to tear the body of the tender loose from its frame and throw it around at right angles to the track, as

shown in the accompanying illustration. The first car behind the tender was overturned and landed bottom up, to the left of the track, while the second and third cars were thrown over to the right. One of our illustrations shows the point at which rupture took place in the boiler. It will be seen that the firebox is entirely gone and the tube-sheet and tubes are exposed, showing the staybolts either ruptured or pulled out. Several staybolts, we are informed by our correspondent, were found to be eaten through and others

firebox, which is built of copper and is dome-shaped, is the survivor of three similar engines that were built in the early '40's for this railroad, though the two previous engines were somewhat smaller. The cylinders are 14 inches in diameter, with a 24-inch stroke. The steam pressure was 120 pounds per square inch. The heating surface of the tubes is 805 square feet, and of the firebox 49 square feet. The total weight of the engine and tender in working order was 32 tons 8 hundredweight. The wheels are four coupled, 4 feet 9 inches in diameter on the tread, and the engine frames are of the frame type with upper and lower members. The axle boxes are made of gunmetal and the motion is of the curved link type. The boiler is 11 feet 2 inches long and 3 feet 6 inches in diameter. The boiler plates are made of Low Moor iron throughout



EARLY ENGLISH LOCOMOTIVE; IN SERVICE 1846 TO 1901.

almost through by the action of the alkali in the water.

A LOCOMOTIVE CURIOSITY.

There has just been withdrawn from service in England one of the oldest locomotives in existence. Up to a few weeks ago this engine, which was constructed in 1846, was regularly employed for hauling mineral traffic upon the Barrow-in-Furness Railroad, which was one of the first railroads in England, having been opened for traffic for considerably more than half a century. The total length of this railroad is only 170½ miles, yet it is one of the most profitable lines in the United Kingdom, a fact due to a large extent to the heavy mineral traffic that it carries.

This engine, officially known as "Number 3," but familiarly styled "Old Coppernob," from its curious

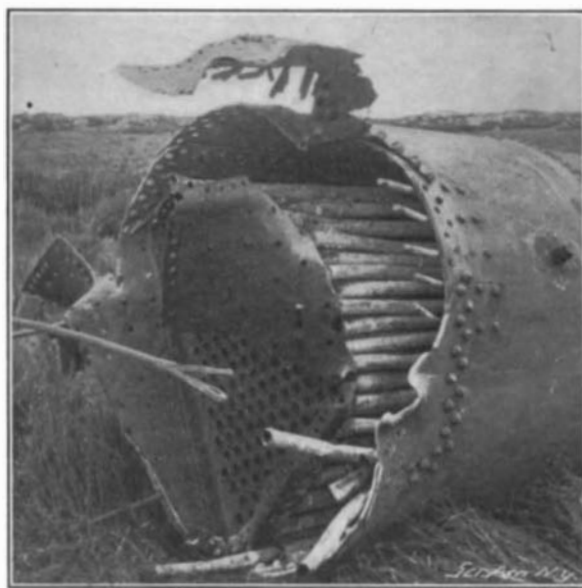
with the exception of the firebox, the barrel being made up of three rings.

A curious feature of the tender of the engine is that the under frame is constructed entirely of oak. The tender has a water capacity of 1,000 gallons. Although this old locomotive has been regularly running for over 53 years, when withdrawn from service it was found to be thoroughly strong and perfect in every respect. The working parts were in first-class condition. Although old-fashioned in design and pattern, it was a very serviceable engine, and an idea of the serviceableness of this type of locomotive may be gathered from the fact that the same company has several other similar "copper-nobs," though of a more recent date, still running upon its system.

Now that it has been withdrawn from active service the locomotive is to be placed in a well-merited place of honor. The railroad company are having a special glass-covered case erected in a prominent position at their Barrow terminus to accommodate the relic, and it will constitute an interesting memento of the early days of the railway era and also form a striking contrast with the feeter and more powerful locomotives of to-day.

Use of Old Wooden Paving Blocks.

An ingenious use has been found for the discarded wood blocks with which the London streets are paved. The woods employed for this purpose are the karri and jarrah woods of Australia, which, owing to their density of grain and extreme hardness, are peculiarly adapted for paving purposes. This wood, owing to these characteristics, is familiarly styled "ironbark." Hitherto when a street was renewed the old wood blocks were sold at a low figure to the poorer classes, and in some instances were given away to those who cared to carry them away. They are, however, now being put to a new use. The wood blocks are in reality only surface damaged. The inside is as hard and as durable as it was when first laid down. Realizing this feature, several toy manufacturers throughout the country approached the authorities, and now purchase all those blocks which are not damaged in the process of being torn up, for the purpose of making the cheap toys out of them. The wood is bought at a low figure, and by means of special machinery that has been laid down the outside is trimmed off and the remaining portion converted into small toys. The wood, owing to its strong nature, is excellently suited for this purpose; and owing to the fact that the raw material is purchased so cheaply the home manufacturers are in a position to undersell consider-



The Wrecked Boiler.



View from Front of Train.

LOCOMOTIVE EXPLOSION AT LA VETA, COLORADO.