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## SOME GREAT ENGINEERING PROJECTS

The shoriening of commercial rontes by means of ship railways and ship canals seems to be the great ambition of the engineers of to day.
In addition to the De Lesseps Ship Canal at Panama, the Eads Ship Railway at Tehuantepec, the Florida Ship Canal the Chesapeake and Delaware Ship Canal, the Cape Cod Canal, and others in the interior of this country, there are several other important projects of like nature under way or in prospect in various parts of the world. The old pro ject of connecting the Bay of Fundy and Baie Verte, on the Gulf of St. Lawrence, across the Isthmus of Chignecto, has lately taken new form. It is now proposed to make the connection by a ship railway eighteen miles long, thus mak ing a short cut for navigation between the United States and the ports on the St. Lawrence Gulf and River, and saving the long and dangerous vovage around Nova Scotia
The projector of the ship railway, Mr. H. G. C. Ketchum writes us that the plan grew out of a desire to save lockag and a deep channel in the design of the Baie Verte Canal His first plan was to lift vessels by hydraulic power on pon toons and then float tiem through the canal. The idea the occurred that they might as well be lifted to the surface of the ground and hauled across the neck of land on rails. Th road may be level and perfectly straight from end to end The plan has been submitted to the Dominion Governmen and is favorably entertained. Mr. Ketchum has issued an interesting pamphlet relative to the project, which may be considered at greater length else where.
Across the ocean the construction of the tunnel under he British Channel, connecting England with the Continent is being prosecuted with an energy which is indicative of altinate success, and thus far no obstacles have been enceun tered to make the undertaking a difficult or exceptionally hazardous one
In France the connection of the Atlantic with the Medi erranean by a ship canal, to save the long and stormy voy age around tine Spanish Peninsula, is under serious consideration, and the Council-General of the Seine have just adopted a resolution approving of the project.
The ship canal across the Isthmus of Corinth, in Greece to shorten the route to Constantinople and the ports of the Black Sea, las, we believe, been definitely determined upon In the far East a bolder and more important project is in contemplation, with a view to shortening the commercial route to China and Japan by six Dundred miles or more. At the head of the Malay Peninsula is the Isthmus of Kraw connecting Upper with Lower Siam; and by the cutting of a ship canal at this point, about thirty miles in length, the need of sailing around the peninsula might be obviated. At Kraw, the Malayan Peninsula, which stretches southward for five hundred miles to Singapore, is at its narrowest breadth, and the distance across from the side of the Indian Ocean to that of the China Seas is further decreased by the existence of natural waterways for some distance inland from both shores. From side to side it is no more than fifty miles, and the Pakchan River, on the western coast, and the Htassay on the eastern, afford the ready means of further reducing it. The distance, therefore, over which it would be necessary to cut a canal would probably not ex ceed thirty miles. The neighboring districts are known to be fertile and to contain great mineral wealth. A tin min ing company has been established for more than ten years at Malewon, on the Pakchan, and gold has been found in the neighboring stream of the Lenya. So far as known th engineering lifficulties are not of a stupendous character, and political drawbacks and considerations fortunately do not exist.
The French appear to have taken the lead in proposing this important commercial short-cut, and, if the opinion of the London 7imes is well fuunded, the Government of Br tish India will not decline to actively participate in its exe cution.

## RAILROAD ACCIDENTS

Railroad statistics show that there were an uusual num ber of accidents attended with fatal results on American railroads during the year ending October 31, 1881. The foot up 1,492 accidents, by which 397 persons were killed and 1,687 more were injured, being a monthly average of 124 accidents, 33 killed, and 141 injured.
The month of October, as reported by the Railroad Gazette, shows a greater number of accidents than the monthly average for the year, although the fatality was slightly less, the total for the month being 131 accidents, 31 861 persons killed, and 133 more injured. Of the October acc dents, 51 were collisions, 77 derailments, 2 boiler explosions and 1 fire. More than half the number of mishaps, where the time of day was reported, happened in the day time, which appears to be remarkable, although it is said to be not an uncommon thing for more train accidents to occur in day light than in the night time.
January took the lead in number of accidents, 223 having casualties were in September, namely, 56 killed.
There were no less than four successful attempts at train wrecking in October. In one case obstructions were put on the track, in another a rail was removed, and in two more switches were misplaced. In only one casc were the wreck
ers caught, and they are to be tried for murder, an engineer ers caught, and they are to be tri
having lost his life in the wreck.
Six broken bridges are in the record for the month, an
unusually large number. One of these had its abutments washed out, and in two other cases they were small wooden bridges.

## TERRIBLE BOILER EXPLOSION IN OHIO

The new Daytou Wheel Works, one of the finest manufac tories of light vehicle wheels in this country, owned and occupied by Pinueo \& Daniels, Dayton, Ohin, was, on October 25, the scene of a most astonishing and lamentable boiler explosion.
Three persons were killed, a number severely injured, and extensive damage was done to the works.
Henry Rokel, the only man in the fire room at the time of the explosion, which took place at the noon bour, was blown into the fuel room and fatally mangled. Katie Makley, a girl of thirteen years of age, was killed by a flying brick while at play with her companions in St. Joseph's schoolyard, a square away from the boiler house. A young man


Plan of Dayton Wheel Works - (C, rear end of boiler. D, girale of
of seventeen years of age, named Mostbaum, was so badly in jured that he died soon after the accident. He was eating his dinner in the yard. Peter Aplin, the engineer, formerly railroad engineer, but in the employ of this tirm since 1852 in their old works and their new, was in the engine room oiling his engine and preparing to start up the machinery. He was thrown among the ruins badly bruised and cut about the upper part of his body, but able to dig himself out. A number of others were injured. There were fifty or sixuy workmen in the main building.
The plan of the works and the distribution of the parts of the broken boiler are shown in the diagram, Fig. 1. The four story main building and the wings, all of brick, are shown in Fig. 2. Other buildings, including a large dryhouse, shown in the foreground of the diagram Fig. 1, are mitted from Fig. 2 for the sake of clearness of illustration. The one story building (Fig. 2) in the angle was the boiler bouse, in which were two horizontal tuhular boilers, 5 feet diameter by 16 feet long, each containing 46 flues, 4 inches


Dayton Wheel Worns before explosiun.
diameter, full length of the bniler. The steam drums, shown in Fig. 3, were 24 inches diameter by 7 feet long, upon which were attached the safety valves and steam connections, as shown. Each boiler had also a mud drum, 18 inchesdiameer by about 6 feet long, seen in Fig. 5.
The shells of these boilers had double riveted longitudinal seams, were new less than a year before the explosion, and originally bad the appearance of being what they were intended by both makers and users to be-sample pieces of workmanship. The iron was five sixteentlis charcoal brand, slightly under thickness, ranging from 029 inch to 0.30 inch, and said to have a tensile strength of $55,0 \div 0$ pounds to the square inch; meaning simply that a strip 1 inch wide, $0 \cdot 29$ inch thick. would break, if steadily pulled without shock, torsion, or bending, under a force of (55.000 $\times 0.29=$ ) 15,950 pounds acting in a direct lipe parallel to the plane of the strip, as in a testing machine, for example.
These boilers were provided with the usual attachments,

