

The Tehuantepec Ship Railway.

While the preliminary works of the Panama ship canal are in progress—though, according to the imperfect information afforded, the progress is very small and the difficulties far greater than were foreseen—Captain Eads is earnestly developing his project for the construction of a ship railway across the isthmus at Tehuantepec. The abilities of Captain Eads, both as an engineer and a financier, have been too well established by the successful completion of one of the great engineering works of the world—the deepening of one of the mouths of the Mississippi—for this scheme to be passed lightly on one side, and pronounced chimerical; on the contrary, emanating from such a source it commands the most serious attention both in a professional and a commercial point of view; it would be at once the most original and boldest engineering work ever attempted, and if successful would have an incalculable effect upon the carrying trade of America, and to a less extent upon that of the whole world. In the United States the question is one attracting great attention, for not only is the work of M. De Lesseps generally regarded with a feeling of mistrust, and with a sentiment of jealousy also, but the route located by Captain Eads lies so much nearer the direct line of travel that it would naturally absorb nearly all the trans-isthmian traffic.

On a subsequent occasion we shall consider this point in more detail, but at present we will content ourselves with a few figures relating to the two routes. Speaking roughly the ship railway route is at the north and the ship canal at the south of the isthmus connecting the two continents, the lines of crossing being about 1,100 miles apart. This is a matter of the utmost importance, especially since Captain Eads has opened for large ships the great waterway of the United States, and converted New Orleans into a vast seaport. A ship leaving the mouth of the Mississippi for California, Japan, or China would, if intending to cross the isthmus by the canal, after passing the site of the railway, be obliged to follow the coast for 1,100 miles to reach the canal, and having crossed, pass up the coast on the western side for the same distance before reaching Tehuantepec. Thus the voyage would be necessarily 2,200 miles further than by the ship railway. This would represent a saving of about nineteen days on a round trip between New Orleans and San Francisco, and a saving of twelve days on a round trip between New York and San Francisco. Shipowners and merchants alike will understand the practical results of such an economy.

Although Captain Eads' project has not yet advanced so far upon the ground as that of M. De Lesseps, it stands upon at least as firm a foundation, and its ultimate prospects are probably far brighter, apart from its physical advantages. The concession granted by Mexico to Captain Eads is a peculiarly advantageous one, the estimate for construction is only £15,000,000, as compared with £48,000,000 for the canal, and if these figures are insufficient, the excess of cost in each case will probably be in the proportion of the estimates; the work could be completed in four years, and there is no doubt as to the amount of traffic which would await the railway on its completion. Naturally the undertaking will meet with much political opposition in the United States, but on the other hand it will meet with widespread and powerful support. The chief opponents will be those whose material interests lie in preserving railway monopolies, and preventing the carrying out of any work which, no matter how vast the national benefit resulting from them, would produce competition and destroy monopoly. On the other hand, support will come on all sides from those who desire the welfare of the country, and who also have great material interests at stake, such, for example, as the merchants of New Orleans now possess. Under these conditions we think there is little doubt but that the United States Government will accord the guarantee asked of six per cent on two thirds of the capital for a maximum term of fifteen years, subject to conditions which throw the whole responsibility on Captain Eads, and also to special advantages which would well repay them for a guarantee which they might never be called upon to redeem.—*Engineering.*

Recent Elevation of the Himalayas.

The superintendent of the Geological Survey, Mr. H. B. Medlicott, and the deputy-superintendent of the same work, have prepared a manual of the geology of India, in two large volumes. With regard to the movements producing the Himalayas the authors say: "During the interval that has elapsed since Eocene times, while no important movements, except small and partial changes of elevation, can be traced in the Peninsula, the whole of the gigantic forces, to which the contortion and folding of the Himalayas and other extra-peninsular mountains are due, must have been exercised. The sub-Himalayan Eocene beds were deposited upon uncontrorted Paleozoic rocks; and, although the Himalayan area was probably in great part land at a much earlier period, there is no reason for believing that this land was of unusual elevation, while the direction of the Himalayan ranges is clearly due to post-Eocene disturbance. It will be shown, in the chapters relating to the sub-Himalayan rocks, that the movement has been distributed over the Tertiary and post-Tertiary period; and a great portion is of post-Pliocene date. Indeed, the fact that earthquakes are now of common occurrence in the Himalayas, the Assam hills, Burma, Cutch, and Sind, and that many of the shocks are severe and some violent, while the peninsula area is but rarely affected by earthquakes, may indicate that the forces,

to which the elevation and contortion of the Himalayas are due, are still in action; and that the highest mountains in this world owe their height to the fact that the process of elevation is still in progress to a sufficient extent to counter-balance the effects of denudation.

"In Sind and the Suleman ranges, there is much probability that some movement took place during Miocene and Pliocene times. Some slight unconformity between beds, elsewhere conformable, and the absence of different groups in parts of the country, may thus be explained; but the principal disturbance is clearly of post-Pliocene date. To the eastward, in Burma, however, the Pliocene formations of the Irawadi valley are but little disturbed, and the Miocene beds, although contorted, are unaltered; while many of the Eocene and Cretaceous rocks are greatly changed, besides having undergone excessive disturbance and folding. These facts may, perhaps, indicate that the disturbing forces were more severe to the eastward in middle Tertiary times, and that the main action to the westward was of later date; a view partly supported by the fact that there is evidence of elevation having taken place in the Himalayas, near the Ganges and Sutlej, at an earlier period than farther to the westward. In the Simla area there is marked unconformity, due evidently to upheaval and denudation combined, between the Sirmur and Siwalik series, and between the lower, or Nahan, group of the Siwalik series itself and the next overlying subdivision; whereas farther west, in the Northern Punjab, all the groups follow each other in apparently conformable sequence. The evidence, however, is not sufficient to prove that the contortion to the eastward is older than to the westward; and the absence of any important break in Burma is opposed to the suggestion of great movements having taken place in that country in early or middle Tertiary times.

"It is evident that the forces, to which the principal ranges in the extra-peninsular area owe their direction, have not only been exerted throughout a considerable portion of the Tertiary period, but that these forces have acted contemporaneously, at all events in the post-Pliocene period."

Antarctic Ice.

Mr. Buchanan made experiments on the melting point and amount of salt contained in salt water ice.

He came to the conclusion, from analyses of successive meltings, and the varying of the melting point, that in salt water ice "the salt is not contained in the form of mechanically inclosed brine only, but exists in the solid form, either as a single crystalline substance or as a mixture of ice and salt crystals."

He thinks that by fractional melting salt water ice might be made to yield water fit to drink, although when a lump is melted as a whole the resulting water is undrinkable.

We crossed the Antarctic circle on February 16, passing about six miles to the south of it. There was open water ahead, but the Challenger was not strengthened for ice work, and we were not ordered to proceed further south, so we turned back.

There seemed to be a deep opening in the pack here nearly due south of Heard Island.

We subsequently passed within six miles of what is marked on maps as Wilkes' Termination Land, and found that this did not exist.

Wilkes, no doubt, was deceived by the land-like appearance of distant icebergs.

It is to be noted that he merely says that he saw appearance of land here, sixty miles distant, but high and mountainous. Others have named it for him and placed it on the charts.—*H. N. Mosely, Challenger Notes.*

New Lead Process for the Extraction of Gold from Ore.

The tall chimneys of a large building at the foot of West Fifteenth street, New York city, have attracted some attention of late. An *Evening Post* reporter who investigated the building found that it contained machinery designed to extract the precious metals from ores and tailings by a new process which is said to be a great advance upon all previous methods.

Mr. Hamilton, the inventor of the process, said: "The whole thing lies in the affinity of lead for silver and gold. It was discovered, many years ago, that if into a bath of melted lead you plunge a piece of gold or silver heated to the same temperature as the lead, it will disappear so fast that you cannot see it melt. The extraordinary thing about it is that lead will melt at 630°, while silver only melts at about 2,000°; yet, if you take a bar of silver as thick as your finger, and, after heating it to 650°, plunge it into a bath of lead at 650°, you cannot withdraw it fast enough to save it; whatever part has touched the lead will have disappeared.

"The great trouble that I have experienced in my years of experimenting has been that if I crushed my ore and plunged it into melted lead it would not stay there long enough for the lead to get through the mass of ore to the metal. The ore is about thirteen times as light as the lead, so that it would rise instantly to the top. I could succeed in small quantities, but for practical working in which hundreds of tons of ore would be used every day, the difficulty of mixing together two substances of so unequal density as lead and ore was found almost insurmountable. I think that I have succeeded at last by means of a certain apparatus contained in a furnace of brick and cast iron. The lead has an ample chance to reach each particle of ore and extract all the gold and silver. Everything will be done automatically

from the time the ore arrives until the lead containing the gold and silver is poured out to cool. We expect to reduce a ton every ten minutes at a cost of one dollar."

Mr. Hamilton then showed the reporter through the works, in which nearly one hundred men are employed fitting the machinery together. As about thirty-five tons of molten lead are used in this machine, it has to be of the most substantial character. The furnace for heating the ore and the blast fires for furnishing heat are all enormous structures.

MISCELLANEOUS INVENTIONS.

Mr. J. N. Proeschel, of Milwaukee, Wis., has lately patented an improvement in firearms which consists mainly in the combination, with the usual self-cocking lock, of a concealed trigger readily projected from a small guard by a pressure of the thumb or finger. This arrangement, by doing away with the usual open guard and projecting trigger, notably diminishes the bulk and weight of the lock while increasing the safety in handling and carrying the arm. While the invention applies to all firearms, the advantages which it affords when applied to revolvers are especially noticeable. These advantages are, of course increased safety and diminished bulk.

An improved machine for treating grain has been patented by Mr. Charles T. Schramm, of Pontonsoc, Ill. The invention consists in combining an air flue and sliding screens, the flue provided with two openings and hinged plates.

Mr. George W. Logan, of New York city, has patented an improved hat and clothes rack which can be folded very compactly, and the arms of which can be raised, lowered, and locked at any desired inclination very conveniently and quickly.

An improved attachment for cloth-shearing machines has been patented by Mr. David McColl, of Cleveland, Tenn. The object of this invention is to take the curl and slack out of the selvages of cloth, so as to present a smooth, even surface to the shearing cylinder.

Mr. John Brunny, of Fort Scott, Kan., has patented an improved calf and cow weaner. The invention consists in a wire pointed at the end, bent to form a hook, a spring coil, and two angles, and having a pointed wire attached to it in line with its pointed end, the wire bent into a loop at its center, coiled around the main wire, and having its pointed ends projecting. The device is to be applied to the nose of the calf.

Anchor chains are usually connected to the shank of the anchor by a ring or shackle that is held on the end of the shank by a pin or bolt. With that manner of connection the chain frequently fouls with the anchor and prevents it from holding. Mr. John J. Moule, of Fishkill-on-the-Hudson, N. Y., has patented an improved shackle bar for anchors, which prevents anchor chains from fouling without limiting free movement of the chain and anchor.

Messrs. Daniel W. Shaw and Pleasant W. Brown, of Murfreesborough, Tenn., have patented an improved steam engine. The object of this invention is to economize steam and to cause a constant equal pressure or strain upon the driving shaft of the engine. The invention is an improvement on steam engines having more than one movable piston working in the same cylinder, each of which is separately connected with the crank shaft.

Lizzie I. Jones, of Texarkana, Ark., has patented an improved portable bath tub, which when not in use can be compactly folded.

An improved car coupling has been patented by Mr. Nicholas Barr, of Cayuta, N. Y. The invention consists in the peculiar construction and arrangement of the parts, whereby all danger of accident in coupling and uncoupling cars is avoided.

An improved lumber wagon has been patented by Messrs. John G. Seifer and John Maschek, of New Orleans, La. The invention consists, essentially, in a novel construction and arrangement of the reach and connections, whereby provision is made for extending and contracting the length of the wagon to accommodate it to long or short lumber.

An improved thill coupling has been patented by Mr. Clarence J. De Witt, of Havana, N. Y. The object of this invention is to lessen the labor and time required in removing or replacing the thills or pole of a vehicle. It consists in dispensing with the removal of the ordinary bolts, eye-pieces, and rubbers, and providing each thill or pole iron with a loop, through which the projecting end of an eye-piece is passed and secured to the thill or pole iron by a bolt passing through the thill or pole iron and secured by a thumb nut.

Mr. Hiram A. Laws, of Thompson's Station, Tenn., has patented an improved car coupling provided with a lever having double hook at the front end, a fulcrum near its rear end, with a shoulder against which rests the end of a spring for throwing the hooks into engagement.

An improved hoisting machine has been patented by Mr. Henry Field, Jr., of New Bedford, Mass. The arrangement of the parts of this elevator or hoisting machine is such that, by means of a continuously rotating wheel or pulley and link-and-lever mechanism, and friction and clutch mechanism, the action of the machine and the weight will always be under sudden and easy control with the outlay of very little power upon the governing lever.

An improved windmill has been patented by Mr. Isaac M. Steward, of Stromsburg, Neb. The object of this invention is to insure a uniform speed from a variable wind, and also to cheapen the construction of windmills, and economize space.