HYDRAULIC ENGINEERING EXTRAORDINARY.

An iron conduit has recently been constructed which, according to the *Mining and Scientific Press*, sustains the greatest water pressure in the world, namely, 1,720 feet, or 750 pounds to the square inch. It carries the water supply of Virginia City and Gold Hill, Nevada, from Marlette lake, situated at an elevation of about 1,500 feet above the former town, over a valley seven miles in width, the sides of which are steep and precipitous, and through a route presenting engineering difficulties of unusually troublesome nature. The most awkward feature of the undertaking begins at an elevation of 1,885 feet above the track of the Virginia and Truckee railroad, at a point about two miles west of Lake View Toll House, and thence follows by an easterly course the crest of the spur from which it starts: crosses the valley, at the toll house referred to, and gradually ascends to its outlet end, making the entire length 37,100 feet. The water at present is taken from Dall's Creek by an 18 inch flume four miles long, to the inlet, or western end of the pipe. From the outlet or eastern end of the pipe, the water is conveyed through a flume of the same size, nine miles long, into Virginia and Gold Hill, where it connects with the present city pipe system. In the future the water from Marlette lake will be conveyed to the inlet of the pipe, and be added to the supply from Dall's Creek.

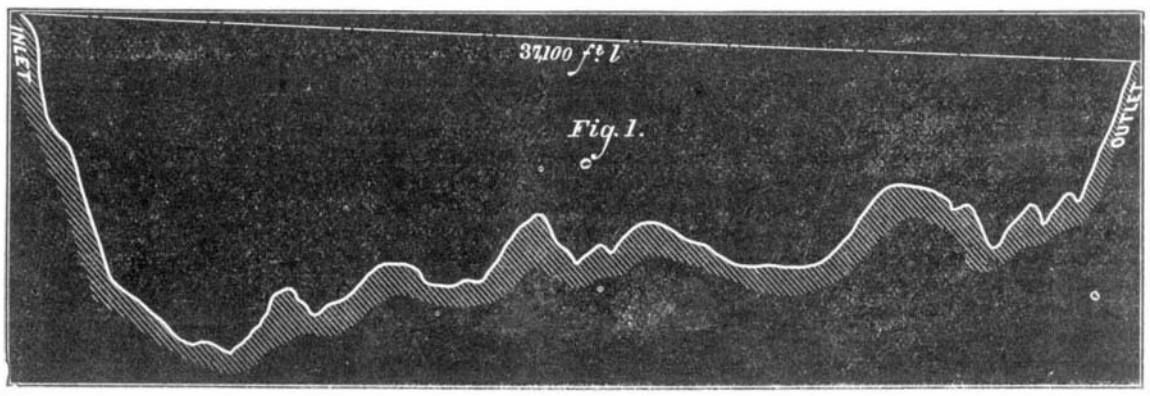


Fig. 1.

All the iron pipe used is coated, inside and out, with a mixture of asphaltum and coal tar, thoroughly boiled together, each separate piece being plunged and rolled about in a bath of this mixture for from seven to ten minutes before being shipped to its destination. The average diameter of the pipe is 11½ inches, and its entire weight about 700 tuns. Nearly one million rivets were used to manufacture it, and some 35 tuns of lead were required in making the joints. At the point of heaviest pressure the iron is No. 0 thick, and is hot riveted with five eighths inch rivets, there being a double row on the straight seam and a single row on the round seam. The pressure gradually decreases as the ground rises to the east and west, and the iron decreases in thickness from five sixteenths to one sixteenth of an inch toward both inlet and outlet. But on its course to the outlet, it having to cross a great many spurs and sags, the iron varies of course according to the pressure.

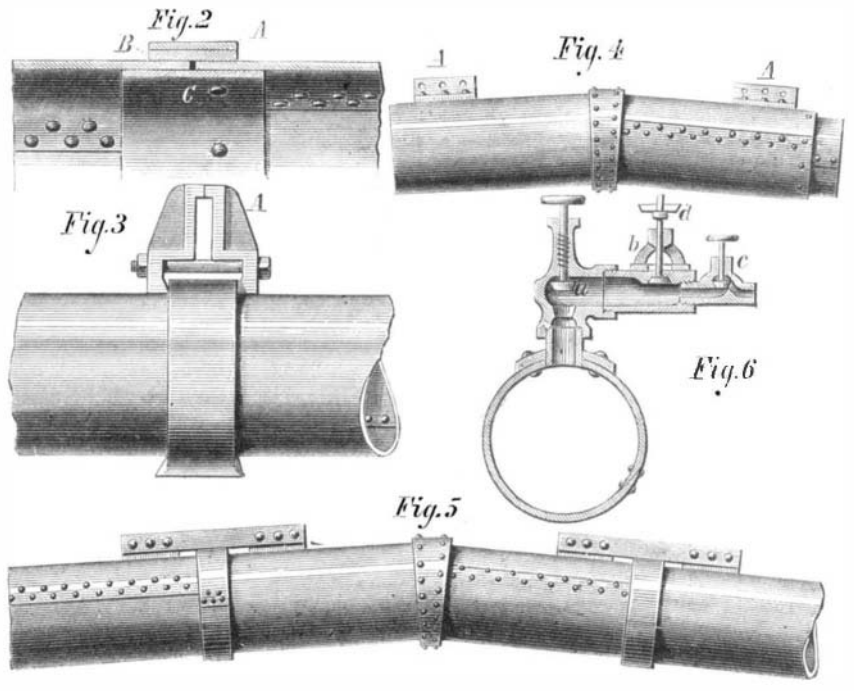
The inlet has a perpendicular elevation above the outlet of 465 feet, but just now only 300 feet is used, as this head will supply ten times as much as the two towns have heretofore had. This head carries into Virginia about 2,000,000 gallons every 24hours; and by increasing the head to its fullest capacity, the supply can be increased to 2,350,000 gallons per day.

Fig. 1 will convey an idea of the country over which this undertaking was carried out as it shows the profile of the pipe. The remaining engravings represent various ingenious plans adopted in the construcion. Fig. 2 shows a lead joint in detail, said to be pertectly tight and safe. One of these joints is made between every two lengths of pipe of 26 feet 2 inches in length each; *a* is a wrought iron collar, always one sixteenth thicker than the thickness of iron in the respective pipe, leaving a play of three eighths of an inch between the inside of the collar and the outside of the pipe. The collar is five inches wide. *b* is the lead which is run in and caulked up tight from both sides three eighths inch thick; C is a nipple of No. 9 iron, riveted in one end of each pipe.

Fig. 3 shows the method of tightening leaky joints. At A is the clasp, the application of which, for forcing back the lead where it works out on account of the longitudinal expansion and contraction of the pipes, is clearly evident. A clamp is used to keep the lead afterwards in place. Fig. 4 is the elbow used for making short curves in the line of the pipe around rocky bluffs, through sharp cañons, etc. At B are angle irons riveted on the pipe on the outside of the curves which, by means of iron straps, are connected with the corresponding angle iron on the next pipe. Fig. 4 shows the manner in which the pipes and elbows were strapped together, wherever the curve was sufficiently short to require this precaution against an outward movement. The iron strap is put on the outside of the curve to strengthen the pipe. Fig. 5 shows the self-acting air or vacuum valve, used at each high point on the line of pipe. When the water is on, the valve, A, is kept wide open; the small valve, C, is shut, while the valve, B, is shut by the pressure. If any air accumulates in the pipe, on the elevation where this air cock is placed, it is occasionally blown off, by opening the cock, C. Should a break occur in the main pipe line at a point lower than the air cock, and within its district, the valve, B, falls down and admits the air into the main pipe so as to prevent a vacuum. Should the valve, B, get out of order, the valve, A, is shut, and the other valve, B, taken off and repaired. After a break on the main line is repaired, and the water let on again, the valve, B, being down or open, the air rushes out at B, its stem being weighted by the weight, D, so as only to close when the water begins to escape.

From the time of commencing the manufacture of the pipe until the water ran into Virginia City, only five months elapsed, ending in August last. The Risdon Iron and Locomotive Works constructed the pipe, and the credit of the accomplishment of the undertaking is due to the engineer, Mr. Herman Schussler.

It is difficult to say which characteristic of our Western engineers is the more remarkable, the courage with which they attack the most stupendous and difficult problems, or the promptitude and celerity with which they carry out their ideas. There is a great future for a country which produces such men and such achievements.



HYDRAULIC ENGINEERING IN NEVADA.

THE CANOPUS STONE.

Hitherto, almost the only guide for interpreting the hieroglyphics with which the monuments of Egypt are covered has been the Rosetta Stone, brought to England by the British army, after the expedition of 1801, and now in the British Museum.

But this is in every way inferior to the stone of Canopus. Half the lines it contains are incomplete, in consequence of the stone being broken and the fragments lost; and of the remaining lines many are defaced or illegible; whereas the stone of Canopus is almost as perfect as on the day it left the sculptor's hand. This inscription was accidentally discovered about seven years since at the southwest corner of Lake Menzaleh, one of the lagoons on the coast of Egypt; and on the old Tanitic branch of the Nile are the ruins of San, the Zoan of Scripture. It is a place very little visited, being remote and not easy to reach. But to judge from the numerous obelisks, statues, and remains of temples still existing there—especially that of Rameses II.—San must once have been a place of much importance. About five years ago a portion of the west wall of the temple of Rameses fell, and exposed the corner of a stone covered with Greek characters. in this state the inscription remained some time; at length its value was perceived, and it was removed to the Viceroy'smuseum at Boulac. It is of fine grained limestone, of light gray color, about seven feet high, two and a half feet broad, and the same deep, and bears three inscriptions, each on a separate side, in hieroglyphic, in Greek, and in the Hieratic (or Egyptian) characters.

It is a copy of a decree made in the ninth year of the reign of Ptolemy III. (Ptolemy Euergetes) by the priests of Egypt, assembled in solemn conclave at the great temple of Osiris, in Canopus. which is called, in the decree, the "Temple of the Euergetæ."

Of this magnificent temple not a fragment now remains; indeed, its very position can only be conjectured. As to the town of Canopus itself, the visitor may trace its site by the high mounds of rubbish over it. It was built on a high promontory (a little to the west of the bay of Aboukir), about fourteen miles to the east of Alexandria. For many years past, nothing of its buildings above ground could be seen, and lately the very foundations have been dug up to provide stone for the fortresses now building on the spot, by order of the viceroy, Ismail Pasha.

The position of Canopus, on one of the large canals or mouths of the Nile, and on the highest ground to be found for many leagues along the coast, must have made it healthy and pleasant; and it was a very flourishing, but, at the same time, a most dissolute, city. There was an open space, planted with trees, in front of the temple. On either side of it were altars belonging to the temples of the first order. After offering sacrifice upon these, and performing the necessary ceremonies for the apotheosis of Berenice, the assembled priests made the decree recorded on the stone.

One of the most remarkable points in this decree is the assigning Divine honors to a living person.

To the Egyptians, not the least esteemed prizes of their King's victory. were the images of their gods, which Cambyses, the Persian conqueror of Egypt, had carried off; and in grati tude for their recovery, his subjects conferred upon Ptolemy the title of Euergetes (the benefactor).

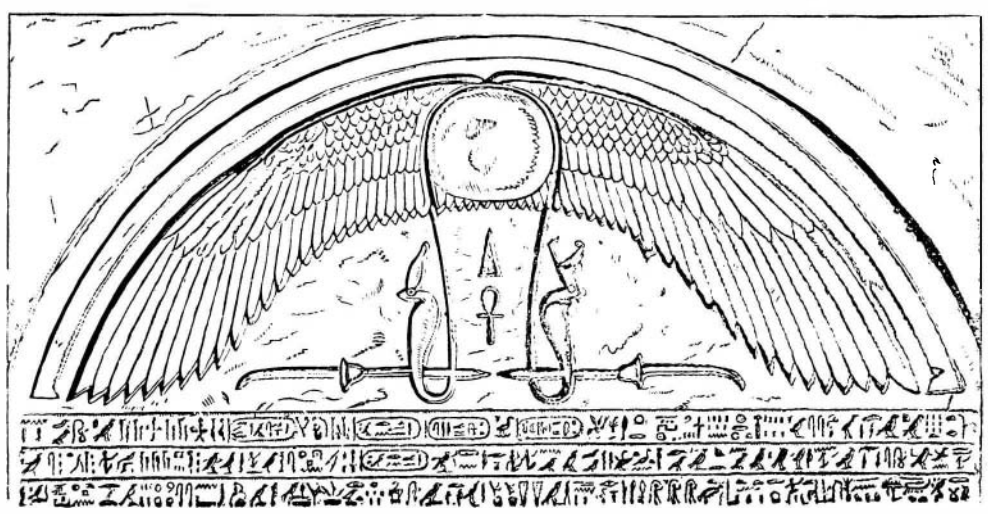
It praises the King's great care for the sacred animals, especially for the worship of Apis and Mnevis.

After setting forth the merits of their rulers, and proclaiming the extraordinary honors to be offered to them, the priests established a fifth priestly tribe, for no other apparent reason than because the king's birthday was the fifth of the month Dios. And then they pass on to the real business of the meeting.

In addition to the three monthly festivals of the Euergetæ, on the 5th, 9th, and 25th days, "decreed in a former proclamation," they ordain that a general public festival for five days shall be held every year, in honor of the Euergetæ, commencing on the day "on which the star of Isis rises," "which in the sacred writings is considered New Year's day." Now in this 9th year of the reign of Euergetes, the rising of "Sirius" occurred on the 1st of Payni (July 19th) and they decided that this 1st Payni, reckoned according to the common computation, should be the first day of the Euergetan festival for four years. And that every fourth year, one additional day (besides the usual five intercalary days) should be kept as a public festival in honor of the rulers; thus introducing on every fourth year six instead of five intercalary days.

By the formerof these two provisions, the priests introduced the Sirius year of 365¼ days, in place of the common year of 365 days; and by the latter means, placing their reform under the protection of the monarch, they provided for the surplus six hours in every year, while by making the extra intercalary day a general festival, "both in the temples and throughout the whole country," they kept it in the people's memory.

The inscription does not inform us in what year this sixth intercalary day



THE CANOPUS STONE.