duced escaping under the bottom of the shaft, and rising up around it. The passage of the four men simultaneously employed in each shaft was effected, two at a time, by means of the chamber or air-lock, M, as will be readily understood. Of the four men just mentioned, three descended to the bottom of the shaft, two of these being employed in excavation, and one in filling the skips or buckets, whilst the fourth man remained on the platform below the air-lock, and was engaged in raising the materials and lowering the empty skips. The full skips were placed, three at a time, in the air-lock, as shown at Y, Fig. 3. The man on the platform in the shaft placed the skips in the chamber, closed the cover, O, and then gave a signal to a man outside, who allowed the compressed air to escape from the chamber, opened the cover, P, and removed the skips.

When the use of the arrangements we have described was commenced, a number of small difficulties were met with. In the first place a very great leakage of air was found to take place through the walls of the shaft, notwithstanding that these had been constructed with the greatest care. This was remedied by an internal facing of cement; but at each sudden settlement of the shafts small cracks were formed which caused considerable leakage, and yet were almost imperceptible to the eye. However, the plan was hit upon of burning in the shaft, when such cracks were formed, a torch making much smoke, this smoke being drawn into the cracks by the escaping air and enabling them to be readily detected and closed by cement. One accident which occurred just after the work was commenced proved of considerable value, as it pointed out a very convenient way of forcing down the shafts when they were so held by the pressure of the earth that their own weight was insufficient to move them. This accident occurred as follows:—The pipe from the air-pump had been carelessly coupled up to one of the shafts so that the connexion gradually yielded, and eventually gave way, allowing the compressed air in the shaft to escape suddenly. No harm was done, but it was found that the shaft had suddenly sunk nearly 4 in. The fact was, that whilst the air was compressed in the shaft, an upward pressure of about 70,000 lb. was being exercised, or, in other words, the weight of the shaft was practically reduced to that extent. On the air being allowed to escape, however, this proportion of the weight was suddenly brought into action, and the effect was the same as if the air had been retained in the shaft and a load of 70,000 lb. had been suddenly applied to the top of the latter. Hence the sudden sinking of which we have spoken.

The method of forcing down the shaft by allowing the air contained in it to escape suddenly, was in fact such a convenient one, that it was afterwards frequently resorted to, and with perfect success. It is only right we should state here that a similar plan was resorted to, a few years ago, by the Hon. William J. McAlpine, formerly the State engineer of New York, when he was sinking the iron cylinders employed in the foundations of the Harlem Bridge.

After the first difficulties had been overcome the work at Perpignan was carried on steadily day and night, each platform being illuminated after dark by an electric light, whilst a similar light, fitted with a parabolic reflector, lit up the service bridge. The work of sinking the pier foundations was first performed, as it was important that they should be completed before the occurrence of the floods. Two piers were constructed simultaneously, the outer shafts of each being first sunk, as we have already stated. The sinking of the centre shaft of each pier was effected much more rapidly than that of the outside ones, on account of the ground having been disturbed; but it required greater care to avoid canting. When the central shaft of each pier was being sunk, one pair of air-pumps only was required, the other pair being employed in furnishing air to the central shaft of the next pier, by means of a long pipe, or being removed altogether to another pier, and worked by hand labour. Women were employed for working the pumps, it being found that sixteen of the powerful Roussillonais ladies would do as much work as twelve men, whilst they were only paid 1½ francs each per day of twelve hours, and the men 2 francs for the same time.

Below the stony bed of the river a layer of soft yellow clay was met with, and in penetrating this it was found advisable to place a pressure-gauge on the top of each shaft, as the soft materials closing round the sill prevented the free escape of the superfluous air. When the shafts had been sunk to a sufficient depth, they were filled in with cement concrete, the concrete being prepared on the service bridge and passed rapidly in buckets to the bottom of the shafts. The best workmen were employed in this operation, and it was found that after practice they were enabled to pass down three buckets full of concrete per minute. When the shafts had been filled to a depth of about 6 ft. 6 in., they were found to be completely water-tight, and further operations could be carried on with the cap removed. Whilst the piers were being completed the construction of the abutments was carried on, the shafts belonging to that on the right-hand bank being almost all sunk without the use of the compressed air system, the excavation being performed by boring holes for mining charges, and firing these below water by means of electricity.

In conclusion, we should state that the particulars which we have above given concerning the foundations