with masonry. Fig. 9, is the heading. Figs. 10, 11, 12 and 13, on page 200, show the system on which the excavation proceeds, and explain themselves.

Fig 14, shows the heading timbered *a*, in moderate good ground, *b*, in fissured rock Fig. 15 shows the heading enlarged, *a*, in moderately good ground, *b*, in fissured rock. Fig. 16 shows the heading enlarged, *a*, in moderately good ground, *b*, in fissured rock Fig 16, shows the timbering of the widened tunnel *a*, and *b*, denoting ground and fissured rock, as before.

Fig 17, shows the masonry of the tunnel complete. Fig. 18, is a longitudinal section of *b*, Fig. 14. Fig 19, is the same as *a*, Fig 15 Fig 20, is a longitudinal section of Fig. 16. Fig 25, is a longitudinal section of Fig. 22, while Fig. 24, is a similar section of Fig 23 Fig. 24, explains itself. Fig. 26 page 201, gives a vertical section showing the arrangement of the shot holes Fig 27, is a horizontal view of the same, while Fig 28, gives the face of the heading. We may add that the dynamite is generally used in iron cartridge cases.

We cannot better conclude this article than by the following tabular statement, which shows the progress of the works up to January, 1874. We may add that since that date they have progressed steadily, at, so far as we can learn, about the same average rate :—

State of the Works on the 31st of January, 1874.

Description of Work for Comparison.	Northern (Goschenen) mouth.			Southern (Airolo) mouth			Total at the end of January.
	State at the end of Dec.	Progress per month.	State at the end of Jan.	State at the end of Dec	Progress per month.	State at the end of Jan	
	Linear metres.	Linear metres.	Linear metres.	Linear metres.	Linear metres.	Linear metres.	Linear metres.
Heading	600·2	72 0	672 2	595 0	51 7	647 7	1319 9
Enlargement (complete and partial) of ditto	520 0	70 0	590 0	87 0	45 0	132 0	902 0
Masonry of arch.....	—	—	—	145 0	—	145·0	145·0
" east side wall	—	—	—	101 9	—	101 9	101 9
" west " ..	—	—	—	141·6	—	141·6	141 6
" drain for carrying off the water.....	—	—	—	115.3	—	115·3	115·3
Workmen Employed during the past Month.							
Mean number	635	— 9	631	521	— 57	581	1215
Maximum do	732	— 46	686	581	— 31	612	1298

From a recent report made to the Swiss Federal Council it appears that, at the close of June, the contractors had completed nearly one-seventh of the whole distance. The progress made during July was about evenly balanced, but the advance on the Goschenen side was rather more rapid than that effected on the Airolo side.—*Engineering*

A Frenchman, M. de la Bâtie, has found a means of rendering glass almost malleable, and is going to start a manufactory for the working of it. He uses a particular bath whilst the glass is just on the point of fusion, by way of tempering it This operation, without rendering the glass malleable cold, increases its strength of resistance about forty times. A 5-franc piece has been let fall from a height of two metres upon a sheet of ordinary glass thus tempered without doing it the least damage.

INCRUSTATION OF BOILERS

Those of our readers who are employers of boiler-power will appreciate at once the world of loss and trouble that is signified in the above title. To non-professional, readers, it may seem a small matter that, during the continuous evaporation of ordinary hard water, a gradual hard scale of calcareous matter is being deposited upon all the surfaces of the metal between the frame of the fire-box and the water. But when these latter will further consider that this scaly deposit is a most perfect non-conductor, they will soon appreciate the fact that its formation seriously affects the economy of evaporation, and increases the danger of burning the plates, and hence of explosion. It is evident, then, that, to keep a boiler in anything like proper condition, this deposition must either be prevented, or the boiler be frequently cleaned out. This latter operation, we may remark, is no slight one, but necessitates through stripping of the boiler, and the scale is usually so hard and so firmly adherent, that it must be chipped off with hammer and chisel, at a considerable expenditure of labour and time. We have already mentioned this subject in these pages, as we consider its importance very great, as bearing on the two vital points to users of boilers—economy and safety, and that it is much ignored.

The arrangements for preventing the deposition of these deposits by the use of boiler compositions or by preliminary heating are but comparatively little used, and in the latter case are often very dangerous to the boiler. There remains, then, the most practical alternative of using some innocuous substance which shall prevent the adhesion of the deposit as a scale on the heating surfaces, but shall cause it to be thrown down as a mud which can easily be got rid of through the blow-off pipe. We have already recommended such a substance in glycerine—practically introduced by our ingeneous neighbours in France—and we hope that some of our readers may have practically benefited therefrom. We are pleased to be able again to bring before our readers another very ingenious and simple remedy against this bugbear.

One of the engineers on board the transatlantic steamer, *Saint Laurent*, accidentally left in the inside of his boilers an ingot of zinc before his departure from Havre. Upon his return, proceeding to examine his boilers and remembering his forgotten ingot of zinc, what was his surprise to find no scaly deposit whatever on the heating surface of the boiler, and further no trace of the zinc ingot. Thinking, on consideration, that the zinc might have prevented the formation of the scale, he again placed in the inside of the boiler an ingot of zinc weighing 80 kilos. On after examination, he found the phenomenon repeated, the zinc disappearing, and no scale being formed, the only residue being a black mud at the bottom of the boiler, easily washed out. This incident was repeated by the user of a boiler of 20 horse-power at Angers, who used the water of the Loire. He then inserted some kilogrammes of zinc turnings, and found that the disappearance of the zinc was in this case as effectual as in the case of the salt water, in preventing the formation of any scale on the heating surfaces.

It only then remains to give some feasible reason for this most valuable phenomenon, and we think that it is not very difficult to find. The two metals, zinc and iron, being in contact with one another, would constitute the two poles of a battery, being positive and negative to one another. The hot water in which they are immersed would always contain sufficient acid to set up chemical action, and we have thus the boiler tranformed into a gigantic pile, completely circulated by electric currents. Now it has been definitely proved by Mr. Field that electricity is an admirable agent to prevent the deposition of a scaly deposit or to remove it after deposition. We have thus a very simple explanation of the phenomenon, which is identical in its character to the action of a zinc plate let into the copper of ships' bottoms to prevent the adhesion of barnacles

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An arrangement which has been nearly completed, has in view the carriage of the mails between the large cities of the United States in rapid trains to be used for no other purpose, and to which the freight and passenger traffic would alike give way. By this means it is expected that letters will be carried between New York and Chicago in 24 hours communication with Cleveland, Cincinnati, &c., would also be greatly accelerated.