

THE NEW GOLD FIELDS.

No expedition since the war, says the *Science Record* for 1875, has attracted more attention or excited more interest than the one which left Fort Abraham Lincoln, Dakota, on the 2d of July, 1874, to explore the Black Hills. This region of country, lying in the southwestern part of Dakota, and extending some distance into Wyoming, and slightly indenting Montana, has, until now, in its interior, been entirely unexplored by the white man. Previous expeditions have skirted the hills, but never penetrated them, and we have been dependent on the reports and traditions of the Indians for the little we have known of them. The hostility of the Indians has defeated any attempts to explore the country by civilian parties.

The present expedition was entirely a military one, and consisted of ten companies of the 7th cavalry, two companies of infantry, and three pieces of artillery, in all about 700 soldiers, with the addition of a train of 120 wagons, and about as many teamsters, the whole under command of Major General George A. Custer. The scientific corps consisted of Colonel William Ludlow, U.S. Engineer Corps; W. H. Wood, assistant; Professor N. H. Winchell, geologist; Professor N. H. Winchell, geologist; Professor A. B. Donaldson, assistant; George B. Grinnell, palaeontologist; L. H. North, assistant; Dr. J. W. Williams, chief medical officer, botanist.

The expedition reached the Black Hills about the 20th of July, after a march of eighteen days, mostly over an arid, treeless, desert country. General Custer, in spite of the prophecies of his Indian guides, who declared the thing impossible, succeeded in penetrating to the very interior of the hills with his wagon train; and by sending off detachments of cavalry here and there, has succeeded in exploring and mapping the hills through their entire length and breadth. The country is found to be of great scenic beauty, as shown by our illustration, and is luxuriant in vegetation, abundant in game, timber, and good water. Thousands of acres of fertile land invite settlement. The country, however, is a part of the Sioux reservation, and cannot be opened to the whites until the government shall make some satisfactory arrangement with the Indians.

On the 31st of July gold was discovered along the banks of a creek, on which the expedition was encamped, the best pans yielding from five to ten cents' worth of gold, equivalent to fifty dollars a day to the man, if the yield should prove as good as promised.

Our camp view of the principal park in the hills gives some idea of the size of the expedition. This site was selected for the permanent camp, and from this point detachments radiated for several days.

Many expeditions to this region have been organized, and numerous persons have been induced to deposit small sums of money for outfit, fees, preliminary expenses, etc. It should, however, be known that the military authorities will maintain the rights of the Sioux Indians, and will prevent any attempt, on the part of white men, to commence mining operations within their territory. The specious advertisements for miners and adventurers to start immediately to the Black Hills gold fields should therefore be avoided.

IMPROVED SAFETY VALVE.

Our engraving shows a new form of safety valve for marine use, from which the steam is led away and blown into the sea without any increase of pressure being necessary. It is the invention of Messrs. D. Cockburn & Son, of Port Eglinton, near Glasgow, Scotland, and three forms of it are shown in the illustration (for which we are indebted to *Engineering*); but a description of Figs. 1 and 2 will serve to explain the whole. This valve, which is  $1\frac{1}{8}$  inches in diameter, was applied to the boiler of the steam yacht Griffin, this boiler being worked at 60 lbs. pressure, and having three furnaces containing 50 square feet of fire grate area. The steam escaping through the valve was not discharged freely into the atmosphere, but was led down through a pipe and discharged through the vessel's side below the water line.

Notwithstanding this arrangement of the discharge, and the large fire grate area, this valve was found capable of preventing any accumulation of steam pressure beyond that to which it was loaded. The manner in which this result is obtained is as follows: Referring to Fig. 1, it will be seen that the safety valve proper, B B, is an ordinary valve with feather guides and bearing upon a narrow flat seat. Below the flange carrying the seat of the valve is formed a chamber, C, and the feathers of the valve are prolonged down-

wards so as to carry a disk, A A, which nearly fits an opening formed in the bottom of the chamber, C. The result of this arrangement is that, on its way to escape through the valve when the latter is lifted, the steam has to pass through the narrow annular space, O O and in doing so, it becomes wire-drawn, causing the pressure in the chamber, C, to be less than the boiler pressure. The upper side of the disk, A, is thus, as soon as the valve opens, exposed to a less pressure than the lower side, and thus the valve, as it lifts, is assisted in opening by the excess of pressure on the underside of the disk, A.

The disk, A, has a thickness equal to the lift of the valve, and its periphery is turned to such a form as to increase the annular area, O O, as the valve rises, the ratio of this in-



THE NEW GOLD REGIONS.—BLACK HILLS.

crease varying according to the way the valve is loaded. In the case of the valve fitted to the Griffin, the bottom disk was originally made as shown at D, Fig. 2; but this form, although suitable for a spring-loaded valve discharging into the atmosphere, was found not to give sufficient lifting power to overcome the resistance of the water in the case of the discharge below the water line. In this latter case it was found that, when the valve commenced to rise, a good deal of power was required to set in motion the water in the pipe, and hence a disk was applied having the edge formed as shown at E E, Fig. 1. This form was found to answer perfectly, as we have already stated. While speaking of this silent discharge, we may mention also that it was found necessary to fit to the pipe an air valve opening inwards to prevent the waste steam pipe, etc., from being filled with water when the blowing-off of the steam ceased.

Of the remaining figures, Fig. 3 shows one of these valves loaded with dead weight, and in this case it will be seen a

very soon) after the meal of the day. All animals always go to sleep, if they are not disturbed, after eating. This is especially noticeable in dogs; and the great John Hunter showed by an experiment that digestion went on during sleep more than when the animal was awake and going about. This is his experiment: He took two dogs and gave them both the same quantity of food. One of them was then allowed to go to sleep, the other was taken out hunting. At the end of three or four hours he killed both these dogs. The food in the stomach of the dog which had been asleep was quite digested; in that of the one which had been hunting the food was not digested at all.

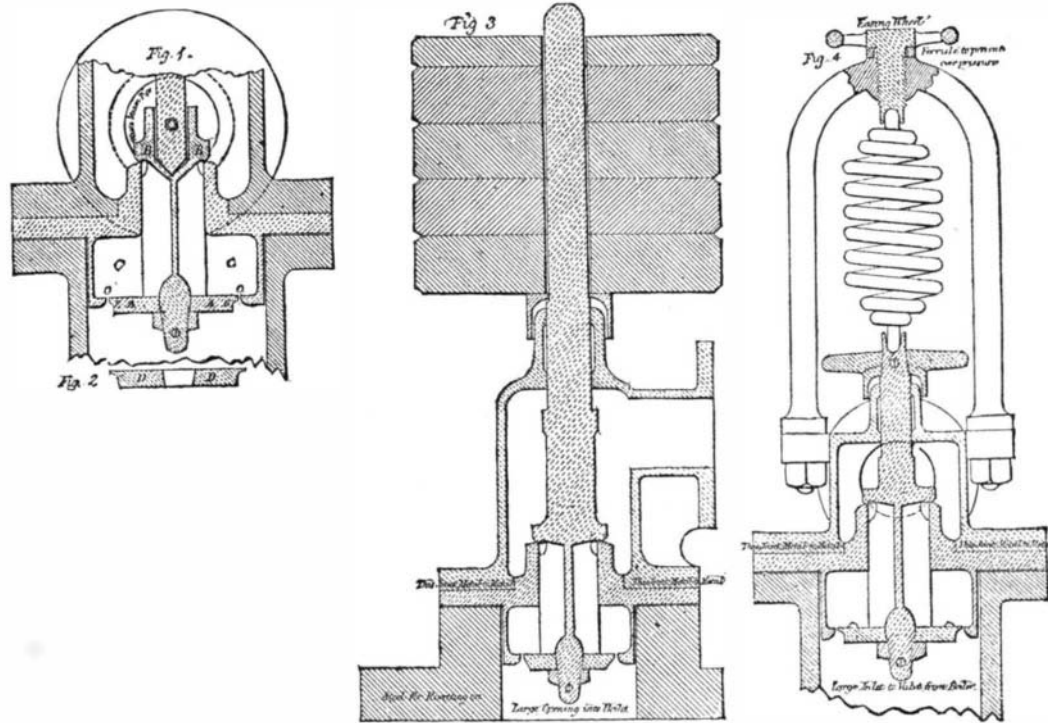
This fact, I think, shows the advisability of going to sleep immediately after eating. This ignored fact always occurs to my memory when I see old gentlemen nodding over their wine. Nature says to them: "Go to bed." They will not go to bed, but still Nature will not allow her law to be broken, so she sends them to sleep sitting in the chairs. People therefore who feel sleepy after dinner ought to dine late, and go straight to bed when a sleepy feeling comes over them.

Most good folks, however, do the worst possible thing imaginable; they retire altogether into the drawing room, and then to make matters worse, they drink tea and coffee. Now I regard tea and coffee when taken at night to be poison to certain constitutions. It is very well in the morning, but it is very bad at night. The reason why tea and coffee should not be taken at night is that the one contains an alkaloid called theine, and the other contains an alkaloid called caffeine. These two alkaloids taken into the system stimulate the brain and do not allow it to go to rest. I speak of this matter from experience.

If I take thoughtlessly a cup of tea or coffee after five o'clock in the evening, going to bed about eleven, I cannot go to sleep; and if the brain does fall asleep, the alkaloid will wake it up in about an hour or two. Sleeplessness, therefore, is usually caused by tea or coffee, though strange to say that tea and coffee actually send some people into sound slumber.

I well recollect the late Dr. Wilberforce, then Bishop of Oxford, telling my father, then most actively engaged as Dean of Westminster, of his patent way of going to sleep. It is better than the old-fashioned prescription of watching sheep jumping through a hedge one after another, ships sailing out to sea, etc. The Bishop's prescription was to repeat very slowly the vowels A E I O. In doing this, they were to be faintly pronounced with each inspiration and expiration. It will be found easy to do this without moving the lips, but the vowel U must not be pronounced, for to do this the muscular action of the lips necessarily takes place, and sleep comes not. I advise my readers to try this plan.

I once heard of a midshipman who complained that he could not sleep at night because there were no waves dashing against the sides of the ship. To this noise he had so many months been accustomed that he could not sleep without the familiar sound. He asked his mother to dash pails of



COCKBURN'S EQUILIBRIUM SAFETY VALVE.

different form of relieving disk is employed; while Fig. 4 shows a spring-loaded valve. Of course other modifications can be arranged to suit various circumstances. Altogether the valve is a very simple one, and it appears in the recent trials to have shown an efficiency which entitles it to special attention.

BRITISH iron rails have ceased for the time to be an article of American consumption. About \$6,500,000 worth of British rails were imported in 1874, but they were all, or nearly all, steel. The change is very great and sudden, for in 1872 our imports of British rails amounted to \$24,000,000, and in 1873, to \$12,000,000. Notwithstanding the great fall in iron since 1872, the decrease in quantities is no greater than that in values, which is owing to the fact that last year we imported only steel rails, which will last a great many years, while in 1872 we imported the cheapest and poorest iron to be found in England.