

in the world. Yet the climate is healthful; the forest, mineral, and agricultural resources are limitless; and the whole region, with the exception of the highlands and sierras of Guiana, is rendered easily accessible by a magnificent river system. The only drawback to its development is the corrupt and inefficient government of Caracas—a drawback, judging by the past decades, that seems destined to outlive the century.

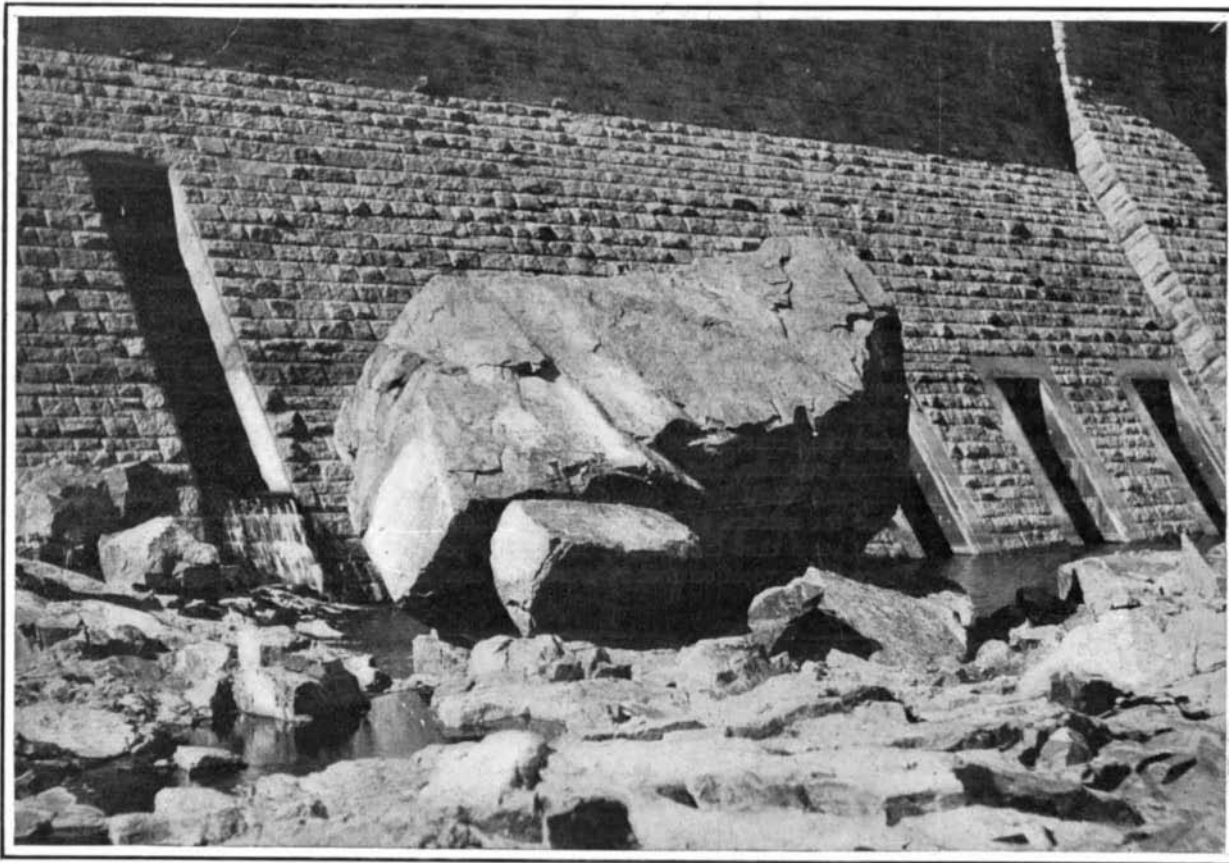
EXTRAORDINARY EFFECT OF WATER EROSION CAUSED BY THE ASSOUAN DAM.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

One of the most perplexing problems to the engineer, when dealing with the control of large masses of water, is the liability of erosion arising from the discharge of the water through a limited space. Occasionally the nature of the surface upon which the released water pours under great pressure and velocity is rugged and broken. Should a crevice exist the checking of the released water thereby is accompanied by a violence almost explosive in character, and the effects of this erosion are often of a remarkable nature.

One of the most extraordinary examples of this action is that shown in the accompanying photograph, kindly loaned to us by Sir Benjamin Baker. In this instance the rush of the water through the sluices of the Assouan dam has dislodged a huge boulder from the rocky bed of the river. As is well known, this barrage extends right across the Nile just above the first cataract, and the flow of the river below Assouan is completely controlled by this dam, the water passing through a series of sluices. At times a huge volume of water is banked up behind the barrage to a height of 60 feet above the level of the downstream. The sluices, however, are built at different levels in the barrage, so that it is possible to control the velocity of the discharge. The maximum head of water allowed is 29.5 feet and this enables the velocity of the released water to be controlled within 36 feet per second.

The bed of the river is solid rock, yet the rush of the water has dislodged this huge piece of rock measuring 17 feet long, 12 feet wide, and 7 feet thick, and has thrown it against the masonry face of the dam. The weight of the boulder Sir Benjamin Baker estimates to approximate 60 tons, yet it has been torn from the rocky bed and hurled backward by the water with the greatest ease.



THE EXTRAORDINARY EFFECT OF WATER EROSION CAUSED BY THE ASSOUAN DAM.

An Inventor's Fantasy.

BY T. A. REEVES.

I have always been fond of inventing. There is no pastime more fascinating and satisfying to my mind. Others may while away tedious hours with books or cards; but I enjoy a stimulating and unending pleasure in fixing my mind on some problem of mechanics, or some of the infinite possibilities of contrivance, and while I am engaged upon it the time speeds away on lightest wings.

Sometimes it is a long railway journey which is thus beguiled and shortened. Sometimes it is one of those irksome half-days of waiting which fall to one's lot in making connections at some cross-country junction, in the midst of a wilderness of scrub-oak; or at some tiresome country tavern, with nothing but the neighboring blacksmith shop to afford relaxation or interest!

Under such circumstances the hours have no horror for me. I seek a quiet corner, and open my design book at some rude sketch of a mechanical idea, and am soon lost to the dullness of the situation, to leaden-footed Time, and to every other annoying circumstance. I have even allowed a slow train to pass the station, while I continued at my problem and awaited a later express.

In the case of sickness, and the necessity of watching and carefully administering medicines, or rendering other attentions to the patients by night, it has been no trouble for me, with an interesting idea re-

volving in my mind, to remain awake, and to care for my loved ones. And often, when wakefulness possessed me, and sleep refused to be wooed, I have composedly resigned myself to the situation, ceased fretting and tossing, and taking up one of my varied inventions, either quieted myself to slumber, or forgot the worry of wakefulness in the delight of its pursuit.

One of the happiest of these devices, over which I spent far more time than the simplicity of the article would seem to demand, was "The Elastic Metal Band." It was intended to replace the rubber band which is so unsatisfactory from its rapid deterioration. The lawyer, author, or business man takes from pigeon-hole or desk a package of papers, or the lady a dainty bundle of letters from her secretary, only to find its rubber band as brittle as clay, and perhaps stuck fast by warmth and moisture to the documents or missives which it bound.

My problem was to create a strap or band which should be perfectly flexible, and at the same time reasonably elastic. If it would stretch one-third its length and return, it would answer every practical demand. Its links must freely move, and there must be no rough ends or open joints to mar the appearance of the strip. It must be flat and neat, and then, when nicked or plated, it would be an attractive and desirable article.

The attainment of all these features gave me no end of trouble. The pesky thing would tangle and hitch in the most unexpected and contrary ways! When adjusted around a bundle and automatically clasped to one's great satisfaction, on turning the bundle over there would be half a dozen links fouled and

crinkled into an obstinate knot, that tried patience almost to the parting point.

I am myself a man of correct language. I do not swear, never having practised, or even learned the rudiments of that accomplishment. When my temper is tried to the last notch, and the expletives seem bound to come as a relief to the pressure within, I simply assure myself that there is need of more thought. Another difficulty has shown itself which must be overcome. If it had been easy to construct this article, it would not have waited for me, but would have been on the market, doubtless, long ago; and some other man, of less patience than myself, would be enjoying the fruits of it. With these philosophic and moral reflections I usually put the article away until with fresh mind it can be taken up again; or, as indeed sometimes happens, until at some unexpected moment the mind, dwelling unconsciously upon the difficulty, flashes out its solution in a moment of inspiration and almost superhuman insight.

Such was the point reached in designing "The Elastic Metal Band." It had been laid aside for a considerable time, as presenting almost insuperable difficulties; when one night I seemed to awake from a refreshing slumber. Never was my mind clearer or keener in grasp of mathematical or mechanical problems than in that hour. I glanced at my clock upon the wall, which I had designed, showing in phosphorescent figures the time, 2:45 A. M. Immediately the elastic band came into my thought, and was pictured before my imagination as vividly as if I held it in my hands. And what is still more to the point, the solution of the difficulty of the entangling links presented

itself to my attention. I could join them so that the crinkling would be avoided absolutely; and the band was in one moment perfected, practical, and complete.

It would be difficult to describe the exultant feelings and triumph of that hour! It was almost a wild joy to have won the victory over all the perplexing obstacles which had arisen, and to see the pretty band of steel, with its ingenious curves, lying like a lady's bracelet, so artistic and beautiful before me! I felt that it would mean fame for me. And there was the genuine usefulness of the invention! It would fill a real want, and obviate the inconveniences of the imperfect article which it was intended to supplant. I saw the windows of the stationers filled with varied and exquisite designs of the elastic metal band; and offices equipped with an abundant supply, on the tables and desks and in the filing cabinets of lawyers, bankers, shippers, merchants, and manufacturers. The government would undoubtedly require immense quantities of these bands in all its offices. And I thought of the vast market for this indispensable novelty in the great cities and in every town and home in our broad land.

I will not deny, also, that golden visions came into my mind of rich pecuniary reward to myself from this important invention. I had before, when the article seemed ready to be patented and manufactured, consulted with a friend who was in the novelty line; and he had named a figure which seemed to me to be very conservative and safe on his side for the invention, and a very modest royalty after the manufacturers had reimbursed themselves for their outlay. But after all, it was a very snug sum in my circumstances; and

there was the certainty that the royalty would surprise my friend when the orders from the whole country began to tax the capacity of his works! In the meantime there was an investment right at hand, in a neat row of cottages, suitable for the skilled mechanics of our city, which would bring a good 10 per cent on the whole sum, while I would have an unexpended part of it still in hand for personal use.

These golden visions filled my imagination with intense satisfaction, until my silent alarm, which was my own invention, awakened me by blowing a current of cool air upon my face; and with returning consciousness I realized that the difficulties were not yet fully solved, which barred

from completion "The Elastic Metal Band."

Violet and Ultra-violet Rays Given Off by Metals at Ordinary Temperatures.

Those who have seen a winter night in the North will probably remember the brightness of the landscape even though the sky be covered with thick clouds. This phenomenon suggests the hypothesis that the snow has some luminosity of its own, and this problem is treated by Prof. Melander, of Helsingfors, in a recent paper published in *Annalen der Physik*.

After experiments made with a photographic camera imbedded in the snow failed to give any satisfactory results, the author eventually observed a very striking photographic effect of the snow cover. As, however, the photographic plates were covered with metal plates, Mr. Melander thought it necessary, first of all, to ascertain whether these did not exert any effect of their own.

Experiments made in this direction showed all metals to give off violet and even ultra-violet rays even at ordinary temperatures, though these rays are too weak to be noted by our eyes. As the temperature increases, this radiation becomes more and more intense until even our eyes are affected by it at a white heat. This radiation is possibly produced by certain chemical processes which occur at the surface of the metal, though the effect on sensitive plates seems to be due immediately to the surface rather than to any emanation.

The ionizing power of these rays may play an unthought-of part in nature, and the author suggests that such animals as see in the dark may have eyes especially sensitive to them.