

Progress in Science.

Harnessing the Sun's Rays.

THE possibility of using the heat of the sun's rays to raise steam for driving machinery has been the dream of fertile minds for many years. Weird and immense plants were erected, comprising the disposal of narrow or lower upon towering frames of fantastic design for the purpose of focussing the rays to heat upon a vessel or some other arrangement wherein water circulated so that it might be converted into steam.

When these plants were erected and set to work, startling figures and stories were told of the work they were accomplishing, and the reclamation of the desert regions in the equatorial belt was heralded. But somehow or other when hard-headed commercial men came to investigate the claims advanced by the inventors, cold cash and inventiveness did not harmonize. True, the plants did the work more or less, but the cost of accomplishing it was so great that from the financial standpoint the ideas were worthless. The result was that plant after plant disappeared, and the inventors relapsed back into obscurity, more or less disgraced with commerce for having shattered their claims in the air so ruthlessly.

Yet their ideas were sound in the main; they worked them out wrongly—that was all. This fact has been proved conclusively by Mr. Frank Shuman, a persevering American inventor. Years ago he was fascinated with this quest, and resolved to harness the sun in such a manner that it could compete advantageously with other methods for raising power. First, he ascertained where other inventors had failed in prosecuting their experiments, and determined to profit from their failures. Not that he has copied them; he has merely avoided the pitfalls which beset them. He realized from the first that the initial outlay upon such an installation must be so low that the interest on the investment does not render it commercially unprofitable. Then it had to be essentially practical. He kept these two factors which had wrecked all previous efforts steadily before him, and the result is that he has scored a success.

Once on the right road, he set to work to erect a complete plant upon the principles he had evolved. This installation has been completed at Tacony, just outside Philadelphia, and here, when the elements are propitious, the sun is made to convert water into steam for driving machinery. The situation of the plant is not ideal. It is very near the Equator, where the sun pours down intensely for day after day, the results achieved would be more striking, but Tacony is convenient to the financial centre, and does not entail a long journey on the part of those interested to investigate the subject for themselves.

Besides, the fact that it is working successfully in the face of difficult conditions serves to emphasize its value. At Tacony, when the sun is shining, the engine may be seen pumping water to a height of thirty-three feet, at the rate of 2000 gallons per minute, the steam engine, which is of special design, embodying many novel features, deriving its motive power from water converted into vapour by the sole agency of the sun's rays.

The inventor has devised his apparatus especially for operation in tropical countries where, although there is plenty of sunlight and solar heat, as a rule there is a scarcity of fuel. In some places coal runs up to about 25 a ton, and, accordingly, mechanical power is a double luxury. The machine possesses

patent in raising water by this method. These workers probably will view the introduction of the sun engine with mixed feelings, because a single installation of the size of the Philadelphia plant will displace 1000 of these labourers.

Sex Determination.

For many years a scientific breeder of stock in England has been investigating the question of the determination of sex. He now considers that in most stock he can prophesy with considerable certainty the sex of the offspring, and his views are to be published in a small pamphlet called "The Prediction of Sex at Will in Animals." His secret appears to lie in a close and particular study of the mare immediately at the birth of the foal. He thinks he is what is called a male or a female "propensity," and by judging the degree of this propensity in the father and mother the probability of the offspring's sex can be accurately foretold.

The author, who has had twenty years' experience with every sort of stock, has achieved great results and is confident that the rules and new lines laid down in this pamphlet on sex propensity will be followed by all stock breeders with success, and that the Government will found breeding studs or

Malay Carlination.

It was reported by Mr. Yapp, the English naturalist, who explored the mountain ranges of the Malay Peninsula, that in several species of bamboo the hollow internodes—the parts of the stems between the joints are stored with large quantities of naturally filtered water. The knowledge of this fact might be of great service in an emergency. Mr. Yapp also discovered on his last visit two species of ferns, growing on trees, whose thick, fleshy stems are filled with galleries furnished by ants, the ferns thus forming living nests for the ants.

Beavers Work.

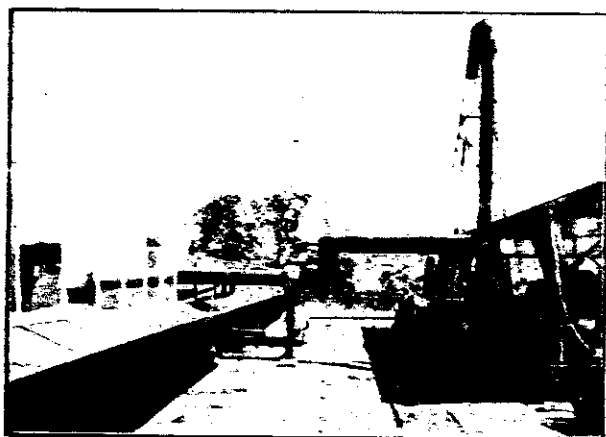
The beavers not only build dams for the purpose of making farms, but also use the small upper branches as a storage supply of food for winter use. Says a writer in an American exchange: "These branches, from two to four inches in diameter, are cut into lengths of two or three feet and then by wonderful engineering ability are carried beneath the water and into the beaver's houses or lodges, with which the bank of every beaver dam is heavily combed. Here they are carefully stored. The green bark is the staple article of food throughout the winter. The stems are of varying length and length of cording to the particular location. I found a dam in Nova Scotia, Canada, which was just six feet from bottom to top, and impounded a body of water six feet or more in depth and covering an area of several acres. This dam was perfect in construction. It was composed entirely of willow bushes, as no large timber grows in the vicinity."

Caspian Oil Wells Threatened.

A St. Petersburg message published in London states that the Russian gas and industry seems to be threatened by a mysterious danger, difficult alike to explain or to dispel. The Russian Commission, working under the auspices of the Imperial Academy of Sciences, has been petitioned to investigate the formations of the bed of the Caspian Sea, which has been steadily rapidly of late, with the result that the Russian industry is being affected injuriously. The question actually before the commission is whether the shoaling process has been caused by a lowering of the level of the water, which is seemingly vanishing, or whether the shores of the Caspian are rising. A sub-commission, consisting of six specialists, including the Director of the Imperial Observatory, has been appointed to study on the spot a problem which the representatives of the various oil firms regard as of the highest importance to industrial Russia. A conjecture has been hazarded by some that the change of level results from the annual withdrawal of millions of tons of naphtha from the ground.

Pictures That Animals Wear.

A painter has discovered that Nature herself is the first of all painters and copyists of natural scenes. Nature's colours are the pigments in birds' feathers, butterflies' wings and animals' fur. Her canvases are the living forms of her children. So that they may be concealed from their enemies, she paints upon them such pictures of sunshine and snow, of mountains and valleys, of forests, skies, waters, jungles, bush, scrub, and desert that the pictures—to speak in a paradox—are even nearer to the truth than the originals. She paints sunshine and shadow on a leopard's coat, and in sunlight-dappled earth he is invisible. She pictures the sky in the white tail of a rabbit, and against the sky no tail is to be seen. On an owl's back and wings she paints so perfect a woodland scene that the form of the owl is lost to the eye amid the leaves and branches of the wood. The gorgeous peacock is a striking object on a white terrace; but the painter's eye saw that from the golden-green of the forest's sunlight, through all the dark tints of leaves in shadow, and the gaps and patches of sunlight on bark and ground, all imaginable forest tones are portrayed by Nature in this bird's plumage. So that in the forest he melts into and blends with the scene in a way so magical as to be past under-estimating. It is through seeing these things with his painter's eye that the American artist and naturalist, Abner H. Thayer, has come to discover a hitherto unrecognized law of colour.



BLOWING OFF THE SUN MADE STEAM.

The engine has been stopped and the safety valve is blowing off at one-half pound above atmosphere.

illimitable possibilities for raising water for irrigation in such arid countries as Egypt, Chile, and the interior of Australia. This, indeed, will constitute its most successful field, and this fact is recognised, inasmuch as the plant, which has been doing duty at Tacony is being dismantled, and is to be transported to Egypt to assist in reclaiming the existing sterile wastes in that country.

In Egypt at the present day irrigation by pumping is carried out upon the same lines as obtained centuries ago. The shadoof still holds powerful sway, and it is computed that 500,000 labourers find a more or less temperative occupation

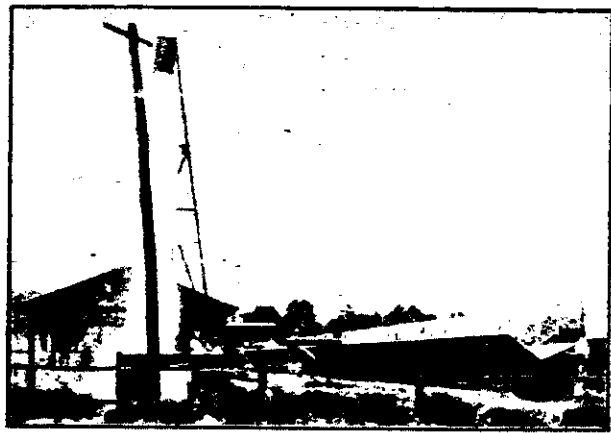
where breeders can have their stocks replenished and renewed. A sufficient number of approved breeders of sires and dams should be subsidised. Breeding of animals will then be on a strong, safe, and proper foundation."

A Deep Bore.

What is believed to be the deepest hole in the ground has been sunk at the village of Cornlow, in Silesia, Germany, affording exceptional opportunity for scientific study. The bore is 17 1/2 inches in diameter at the mouth and a little short of two inches at the bottom. The exact depth of the hole is said to be 1343 feet. For a distance of 6843 feet it is lined with iron tubing. The experiment, that has so far been made with the bore shows that the temperature of the earth increases at the rate of one degree Fahrenheit for each section of 55 feet, or one ley, a centigrade for each 104.3 feet.

Value of Wireless.

Several determinations of longitude have of late been made by means of wireless messages, but the most ambitious attempt of this nature has just taken place between Paris and Tunis. Wireless signals connecting two clocks, one at the Eiffel Tower and the other at Bizerta, Tunis, the comparison of which decided the longitude. The signal travelled the whole distance in 0.007 second, which works out at nearly 200,000 miles a second. When Sir George Airy, Astronomer Royal, determined the longitude of Valencia, the little island on the coast of Kerry, where the Atlantic cables enter the sea, he had no fewer than thirty chronometers carried by kowals and ferries between Valencia and General's Observatory 22 times before he was satisfied.



THE SUN POWER PLANT IN ACTION.

RAISES 2000 GALLONS OF WATER PER MINUTE TO A HEIGHT OF 33 FT.