

pipes and in drops to the eccentric, but valves are provided on the pipes so that the supply can be regulated as desired; and the reservoir can be supplied with fresh oil while the engine is running. Besides the saving in oil, these devices keep a clean and presentable engine and engine-room.

The automatic cut-off governor is shown in Fig. 3. It is an isochronous governor, very simple in construction, and responds instantaneously to the slightest variation in load, cutting off the steam at a point that will just do the work and maintain the fixed speed of the engine. It is secured to the side of the fly-wheel, and connects direct through the eccentric on the main shaft with the valve, without the use of gearing, pulleys, shafts, or belts. All its parts are in sight, and are readily accessible for cleaning. It gives an open port at the beginning of each stroke, admitting steam to the piston at full boiler pressure, and varies the point of cut-off as the load requires, from the beginning to three-fourths of each stroke. The speed of the engine remains practically constant, regardless of the change of load or variation of steam-pressure in the boiler, the variation from no load to the full power of the engine being, it is claimed, less than one per cent. The

#### SCIENTIFIC NEWS IN WASHINGTON.

Does Exposure to the Sun cause the Human Skull to be Harder and Thicker? — Diseases of Menagerie Animals. — The Geological Survey.

#### Does Exposure to the Sun cause the Human Skull to be Harder and Thicker?

ONE of the most interesting things mentioned by Professor Virchow in his little book just published, entitled "Medical Remembrances of an Egyptian Journey," in which he describes an excursion up the Nile as far as the first cataract, is that the broken skulls on the first great sepulchral fields, dating from Roman times, are as thick and hard as Herodotus says those of the slain Egyptians were in comparison with the brittle ones of the Persians. The Greek historian explains this by attributing it to the early exposure of children to the heat of the sun; and in many parts of upper Egypt the German travellers actually found young children thus exposed during their parents' absence in the fields, in immense clay bowls, resembling in shape a champagne-glass with a stem, into which they were put without shelter.

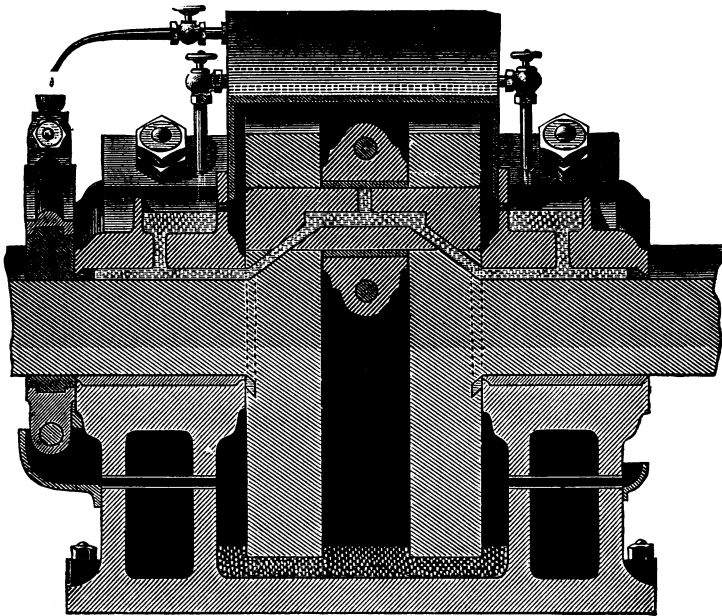


FIG. 2.

dash-pot attached to the eccentric prevents any sudden movement of the weight when a great change of load occurs suddenly. The running speed of the engine may be changed to suit requirements by shifting the position of the weight on the lever.

The steam-chest is bored out and fitted with a pair of cylinders or bushings which have supporting bars across the ports, to prevent any possibility of the valve catching upon the ports. The valve is of the hollow piston type, — a hollow tube, with a piston at each end. It is surrounded by steam, which presses equally upon each end, thus perfectly balancing the valve and relieving its pressure, insuring it long service with little wear. The piston-head is a single casting, hollow, and as light as is consistent with strength. The cross-head is a crucible steel casting, with phosphor-bronze slides; and the attachment to the connecting-rod is central, thus avoiding any strain on the piston-rod by angular thrust. The guides are bored out the same size as the cylinder, thus insuring large wearing surfaces and constant accuracy of line with cylinder. This, together with the self-oiling devices, insures cool running, and long service without adjustment. It may be added, that the construction seems to be such as to give the required strength and rigidity for high speeds; ample wearing surfaces are provided; all the parts are made of steel, phosphor-bronze, and charcoal iron, and are interchangeable; and every engine is tested by actual service at the factory.

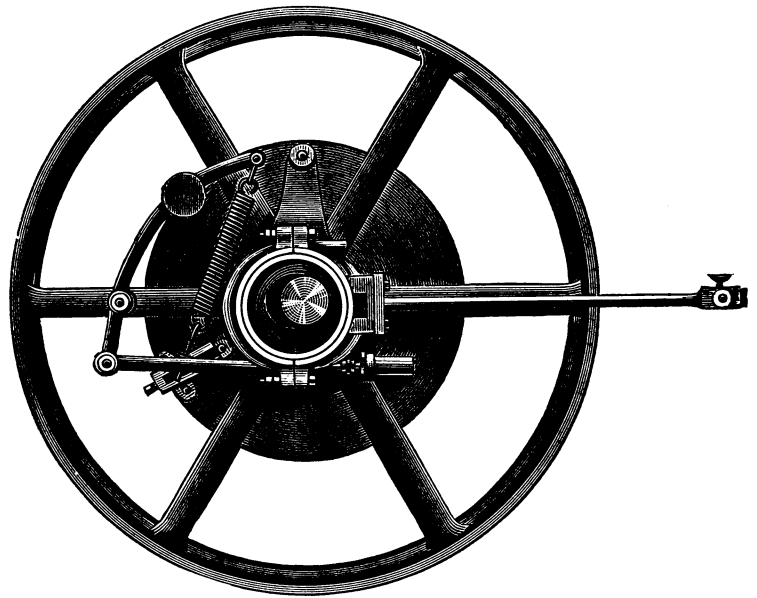


FIG. 3.

This discovery by Professor Virchow is interesting, because it at once suggests the question whether the proverbial thickness of the skull of the negro has not been caused by exposure to the sun, and whether it is a peculiarity of savages of tropical countries that their skulls are thicker and harder than those of the inhabitants of temperate and colder countries.

Students of craniology have never made any investigation to ascertain whether the skulls of different races vary in degrees of hardness. It would be almost impossible to make such an inquiry. As is well known, the human skull increases in hardness from childhood to maturity and age. A miscellaneous collection of skulls of any given people would therefore be of no value in such an investigation. To obtain a collection of skulls of a number of nationalities, that should be taken from subjects all of the same age, to have them all similarly prepared and in sufficient numbers to make it possible to draw any general conclusions from their comparison with each other, would be manifestly impossible.

More attention has been given to the relative thickness of different skulls, or rather to their weight, from which their thickness may be inferred. Of the large collection of crania in the Army Medical Museum at Washington, the thickest are those of negroes and Alaskan Indians. The skulls of other Indians, both of North and South America, in tropical or temperate climes, and of the Eskimo, do not appear to be particularly thick. Among the ancient

Peruvian skulls recently received by the museum, and the ancient crania collected in Arizona last summer, there are frequent individual variations in thickness, but no tendency to unusual thickness. The conclusion from these facts is, that exposure to the sun probably does not cause thickness of the human skull.

In connection with this subject, it is interesting to note, that, among the Australians the *sinus frontalis* is generally found to be solid in the males, instead of being hollow as in the skulls of other races. This bone in the male Australians generally extends straight across the head, the lower side overhanging the eyes so that they seem to look out from under it, while in the North American Indians a modification of shape deprives them of that heavy look about the forehead. The heavy *sinus frontalis* of the Australians, of course, increases the weight of the skull.

#### Diseases of Menagerie Animals.

At the meeting of the Biological Society, Mr. F. A. Lucas read a paper on "The Diseases of Menagerie Animals." He showed that menagerie animals are extremely liable to disease; and this is almost as true of those born in captivity as of those which are captured when full grown.

Young animals suffer greatly from caries, owing to lack of proper diet, and their bones are very generally soft, swollen, and misshapen. The maxillaries are especially liable to be attacked during the period of teething, and the facial region is in consequence very much distorted.

Diseases of the lungs are very prevalent among menagerie animals, tuberculosis being exceedingly common among monkeys, and found among other animals less frequently. Pneumonia is a frequent cause of death, and birds as well as mammals are liable to be attacked by this disease.

The following is a list of animals examined, where the cause of death was fairly established:—

Macaque (*Macacus cynomolgus*).—Tuberculosis.

Gray fox (*Urocyon virginianus*).—Pneumonia. This specimen also exhibited a very bad case of intestinal catarrh and inflammation of the bladder.

Badger (*Taxidea americana*).—Pneumonia.

Elephant (*Elephas africanus*).—Pneumonia.

Lynx (*Lynx rufus*).—Uræmic poisoning (in two cases).

Black bear (*Ursus americanus*).—Killed. Had been sick for some time with catarrh of stomach and intestine.

Mino bird (*Eulabes affinis*).—Congestion of lungs.

Parrot (*Amazona ochroptera*).—Congestion of brain (?) This bird died suddenly, and all organs were healthy. The blood-vessels of the brain were much congested.

Parrot (*Amazona Levaillantii*).—Tuberculosis.

Tooth-billed pigeon (*Didunculus strigirostris*).—Disease of liver, that organ being converted into a hard, waxy mass adherent to sternum.

Pigeon (*Columba livia domestica*).—Disease of liver, same as above.

Eagle (*Haliaeetus leucocephalus*).—Fatty degeneration of liver.

Night heron (*Nyctherodius violacens*).—Congestion of lungs.

#### The Geological Survey.

Appropriate committees of the Senate and House are considering, with very favorable tendencies, the bill appropriating \$600,000 for the erection of a building for the Geological Survey, on the public reservation near the Smithsonian, where grounds have been allotted to it. The plan submitted by Major Powell contemplates a solid and compact rectangular structure, covering 100 by 300 feet, five stories high, with hipped roof. It will be of Seneca sandstone (like the Smithsonian), or of selected red brick with sandstone buttresses, trimmings, and belt courses, and overground basement of same. The general arrangement will consist of a series of large, well-lighted rooms, averaging 16 by 24 feet, disposed about a spacious central court lighted from the top, and with tessellated floor. In this court the working collections of the survey will be open to inspection. The preliminary ground plans and elevations have been prepared by Messrs. Victor Mindeleff and Delancey W. Gill of the Geological Survey.

#### THE TASK OF STATE WEATHER SERVICES.

PROFESSOR FRANCIS E. NIPHER, in an interesting pamphlet on the rainfall of Missouri, takes occasion to urge the establishment of State weather services. "The State weather service," he says, "bears the same relation to the national service that the State Government bears to the National Government."

"There are many large storms, of great severity, which damage shipping and endanger life. The Signal Service has done a great work in giving warning of these storms. Shippers and dealers in provisions and fruits find the cold-wave warnings of the greatest value. In all large cities the approach of a 'warm spell' is known through the Signal Service predictions, and thousands of tons of meats are hurried to cold storage warehouses, and the opportunity to ship other provisions which must be kept from freezing is anticipated and made available. It is not saying too much to say that it would be impossible to carry on the shipping business of the country as it is now carried on, without the aid of the national weather service."

"But each State has its own peculiar industries, advantages, and interests. It should provide for a thorough study of its own climate, and should distribute published reports for the benefit of those who may desire such knowledge."

"There is another field which peculiarly belongs to the State weather service. The weather which is of greatest importance to the farmer is the weather of harvest. During that time storms are usually very local. They may cover a few counties only, and inflict immense damage. People living in the city can learn from the Signal Service that there will be 'local rains in Missouri,' but nobody knows where in Missouri they are going to locate; and even this information reaches the farmer only after the rain is over, if at all."

"The local peculiarities of these storms require study in each State. Very much has been done in this direction in Iowa and by the New England Meteorological Society. Such work should be at once begun in our State. In three or four years we should be familiar with the behavior of these storms, and this knowledge could be given to all."

"In 1893 the telephone will become public property, and it will then be possible for county telephone services to be established, putting each farm in communication with a county seat. Telephone service can be rendered for a sum which will be utterly insignificant when compared with the advantages which it will bring. Farmers can then keep informed of the markets, can sell their produce before leaving their homes, and will be able to save much time which they now waste during the busy season of harvest. This is all so apparent that it is needless to discuss it further. In addition, there will grow up a system of harvest storm warnings. It will be very easy for any county telephone system to give its subscribers a general warning of an approaching thunder-storm, and to transmit that information to such other counties as may be in danger. The exact details of this scheme may be left to the director of a State weather service to work out. It seems certain that this can and will be done, and there is no reason that this should be done by the national weather service."

#### COMMERCIAL GEOGRAPHY.

##### The Development of Commerce on the Kongo.

THE Belgian Compagnie du Congo pour le Commerce et l'Industrie is pushing on its enterprises vigorously. The most important among these for the development of the resources of Central Africa is the railroad from Matadi to Stanley Pool, connecting the navigable upper Kongo with the highest point that can be reached by steamers. In the past year a corps of engineers was engaged in surveying this line, which offers peculiar difficulties on account of the deep gullies cutting the line to be followed by the road at right angles. At a recent meeting of the shareholders of the company, M. Cambier, chief engineer of the expedition, gave a report of his proceedings, which has been published in a recent number of the *Mouvement Géographique* from which we take the following statements and the accompanying map.

It will be noticed, that while the old caravan route runs approxi-