COMBINED TRACTION ENGINE AND CRANE.

Our engraving shows a combined traction engine and crane constructed by Aveling & Porter, of Rochester, England.

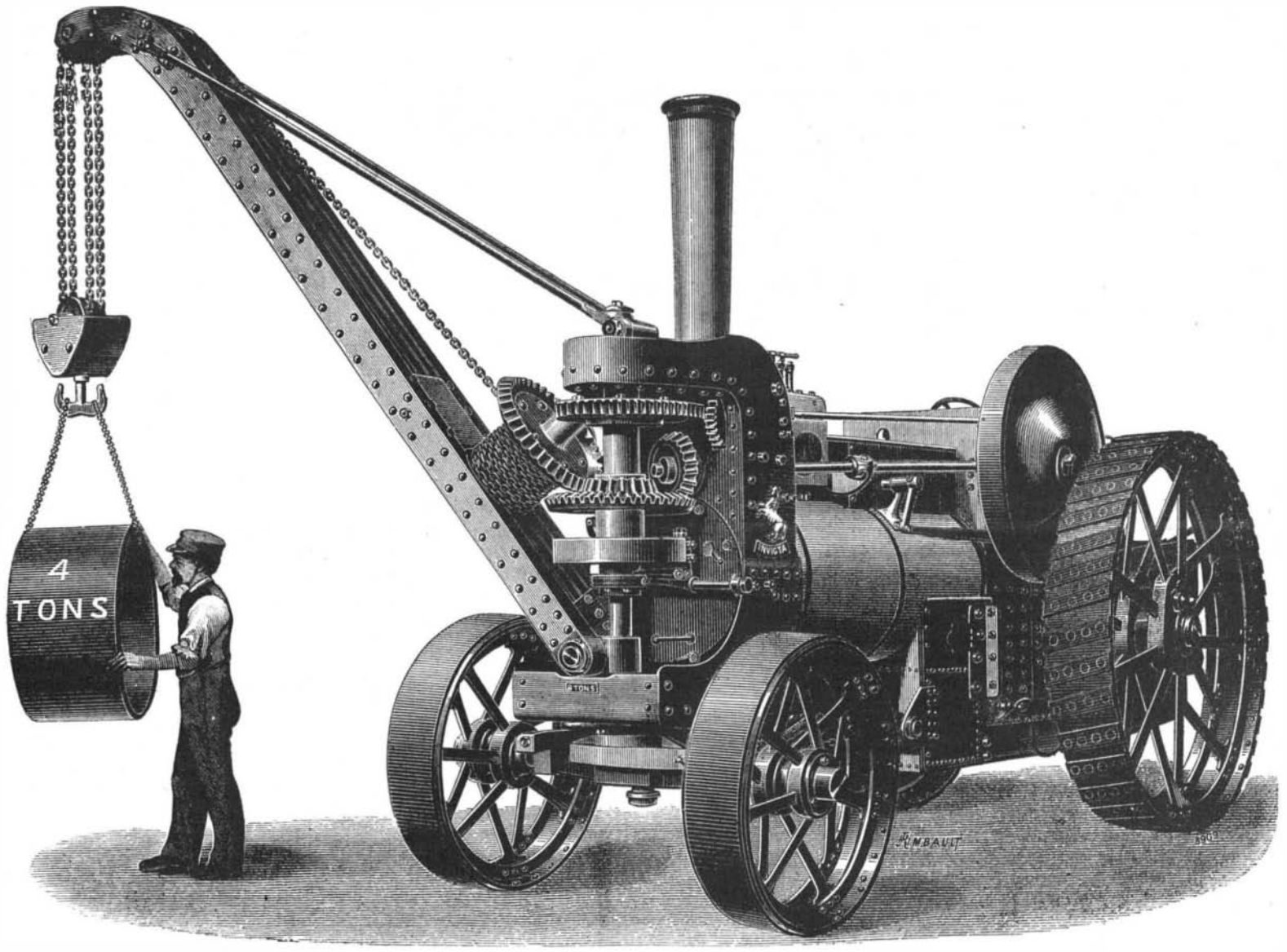
The jib swings on a crane post or shaft standing in front of the smokebox, this post being carried by a wrought iron plate framing of neat design. The chain barrel is mounted on the jib itself, and carries a bevel wheel which gears into a pinion cast on a sleeve which is mounted on the crane post. This sleeve has also cast on it a drum disk, which lies between the driving disk and the brake disk, this latter disk being fixed on the crane post. By means of taper clutch blocks actuated by the levers, the drum disk can be clamped to either the driving or the brake disk, and the load thus be raised, held, or lowered.

The driving disk is in one with a bevel wheel which gears into a bevel pinion on a diagonal shaft running along the left hand side of the engine. This shaft is kept continually running while the crane is in use.

The slewing is effected by a worm gearing into a segment on the crane post. The spindle of the worm carries a wormwheel into which gears a pinion, running on a stud, and receiving its motion from the diagonal shaft through the friction clutches. There are mounted on the diagonal shaft two bevel pinions (both gearing into the pinion on the stud), these pinions running loose on a sleeve which encircles the shaft, and which has formed on it a collar between the pinions. The sleeve revolves with the shaft, and its ends are shaped so as to form in conjunction with the pinions a pair of friction clutches. The two sets of clutch wedges are connected by feathers which pass through the sleeve, so that they are actuated simultaneously by the clutch ring and levers at one end. According to the position of the clutch wedges, either of the pinions can be made to revolve with the shaft, or both can be left free, thus giving full control of the slewing motion.

The whole arrangement of clutches acts admirably, and it has the great advantage of giving full control of the hoisting and slewing movements without stopping or reversing the engine, this being an important point where—as in this case—a single cylinder engine is employed.

The crane is capable of lifting 5 tons with the jib ranging fore and aft, or of lifting and slewing a load of 2½ tons.—*Engineering.*



COMBINED TRACTION ENGINE AND CRANE.

THE gem for January is the garnet, for February the amethyst, for March the bloodstone, and for April the diamond. May has the emerald, June the agate, July the ruby, August the sardonyx, and September the sapphire. The opal belongs to October, the topaz to November, and the turquoise to December.

The Sea Serpent.

PROVIDENCE, R. I., Aug. 7.—The sea serpent seen off Watch Hill, R. I., is reported again in the same district. The sloop Mary Lane, Capt. Delory, was lately on her homeward trip from New London, and when two miles southwest of Point Judith, on Saturday, Capt. Delory sighted a monstrous head two feet above the water and about fifty yards distant. The appearance of the head is described as like that of an alligator. The jaws looked to be at least five feet in length, and were studded with teeth six inches long, while the eyes were as large as the crown of a hat. Back from the head ran a huge fin. The body moved rapidly through the water. The entire length of the creature as estimated in its passing the boat was about seventy feet. The captain says it was within about ten feet as it swept by the vessel. Glimpses of its body, which was about the size of a barrel, showed bright grayish scales.

"Insect Life."

Insect Life is the name of a new periodical which is to be hereafter issued at least once a month by the United States Department of Agriculture, under the editorship of Prof. C. V. Riley, the entomologist, and his assistants. It is to be devoted to the economy and life habits of insects, especially in their relations to agriculture, and is designed to form a speedy and regular means of publication of interesting matter which, for various reasons, cannot be used in the annual reports and which has hitherto been relegated to the archives of the entomological division of the Department of Agriculture. The following are the contents of the first number, which is dated July, 1888: Salutatory; The Corn Pollen Syrphus Fly (illustrated); The Willow Shoot Saw Fly (illustrated); The Sugar Cane Beetle injuring Corn; Extracts from Correspondence; New Species of Oncoenemis; The Australian Parasite of Icerya (illustrated); The Privet Web Worm (illustrated); Notes.

Formation of the Great Lakes and their Changes of Level.

To the June number of the *Forum* Mr. C. K. Gilbert contributes an interesting paper on "Changes of Levels of the Great Lakes," the greater part of which is devoted to the geological history of the formation of these bodies of water. Lakes are formed chiefly by the upheaval of the earth's surface and by its erosion through the movements of glaciers. The beds of the great lakes, with the possible exception of Erie, were scoured out of the solid rock by the great glaciers of the ice age, but accumulations of debris in many cases increase their depth and influence the direction of their outflow. In the case of Erie, for example, the removal of this debris would greatly reduce that lake, perhaps entirely drain it, and would cause it to flow into Ontario and Hamilton. The increase of heat caused the edge of the great glacier to retreat from the southern border at Fort Wayne, where the water resulting from it flowed into the Wabash, and separated Erie and Ontario into two lakes. As long as the ice remained in the valley of the St. Lawrence, the waters found an escape into the Mohawk and Rome. The crest of one of the beaches formed by wave action is marked by the ridge road from Lewiston to Sodus. At this epoch, Erie was but two-thirds as long as it is at present, and its area was but a fifth as great, and Toledo, Cleveland, and the Bass Islands were far inland. When Lake Ontario forced a new outlet through the valley of the St. Lawrence, its level was reduced five hundred feet, and its area 90 per cent, and it thus became 30 per cent smaller than it is at present. The rising of the depressed land to the northward gave the lakes their present dimensions, and the oscillation then received a check. Whether the oscillation has entirely ceased or not, it is now so slow as to prevent the detection of any movement, the present level of the water having remained nearly constant for many centuries.

There are, however, other changes taking place from the action of the rivers. The St. Clair is feebly scouring its channel and forming a delta; the Niagara is eating its way back to Lake Erie; and the St. Marie, Detroit, and St. Lawrence are deepening their channels. All these changes are very slow, and for all practical purposes our inland seas are permanent, and their basins stable. The only modifications that affect our economy are those wrought by the waves upon their coasts. The changes noticed in the water levels are due to the variations in the rainfall upon the lakes themselves, and upon the land drained by the streams that pour into them. The amount of rainfall varies from year to year and from one season to another, and the level of the water oscillates around an average position that remains fixed. The variations in level relate to the entire surface of the lake.

A part of one may be raised and another part be depressed by a gale, especially in the case of Lake Erie, because of its shallowness. A gale has been known to raise the level of one of its ends seven or eight feet, and to depress the other to an equal amount. Differences in atmospheric pressure also affect different parts of the same lake. The rapid change in air pressures, as in the case of tornadoes, sometimes causes rhythmic undulations as high as the largest created by the wind. There are also tides that are as regular as on the ocean, but the highest spring tide rises but about three inches, while the average height is probably not more than one inch.

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Osmose.

It is a well known fact that when two liquids of different compositions are separated by a porous membrane, there will result a double current in opposite directions through the membrane, the consequence is, the two liquids interchange their elements. Observation has shown that one kind of substance, known as *cristalloides*, when dissolved in water, will pass the septum with ease. The others, called *colloides* (gums, etc.), require considerable time for such passage. It becomes evident that if we separate diluted molasses from water by means of a membrane, a portion of the salts will leave the molasses and pass through the membrane into the water. Under these circumstances there would result a liquid, or molasses, the sugar of which might be crystallized. During the osmosing, a certain quantity of sugar is lost, but the reduction of the saline percentage of the molasses is so great that the residuum again constitutes a most valuable secondary product, from which sugar may be extracted. Some experiments have been made to ascertain if there existed any advantage in adding a small quantity of acid to the molasses during this process. It has been found that nearly 30 per cent of the total mineral substances will pass the membrane by the addition of acid, and only 25 per cent under ordinary circumstances.

As the molasses has been diluted by the customary osmosing process, it is evident that the additional water must be evaporated, and this, in itself, represents an extra cost of fuel of no small importance. With every system of osmosing used, it requires considerable experience to determine within what limits the operation may be made profitable.

M. Dubrunfaut, the inventor of the first osmogene apparatus for molasses, called attention to the possible advisability of osmosing the sirups, or even the limed juice prior to evaporation. The objectionable salts would thereby be partly eliminated before the first crystallization, and the quantity of residuum molasses considerably reduced. The working by osmosis of saccharine juices to which lime is added is generally accomplished cold. Through the membrane pass nearly all the salts set free by the lime. The subsequent operations are the same as in the customary methods of working beet juices.

In some cases the profit from working osmogenes is very considerable; it will, therefore, be of the more interest to notice a similar but new process of beet sugar making, advocated by Dubrunfaut just before his death. This method consists in mixing lime with sirups from first centrifugals, allowing them to settle for several days, when the clear portion is osmosed in a boiling condition. The sirup, on leaving the osmogene, may be treated by carbonic acid separately, or added to the limed juices during carbonatation. The water of exosmosis may be evaporated, and worked for the alkalies, etc., it contains.—*The Sugar Beet.*

MACRONUS KETTLEWELLI.

Dr. F. H. H. Guillemard, in his interesting book "The Cruise of the Marchesa," says of his visit to the Sooloo Islands:

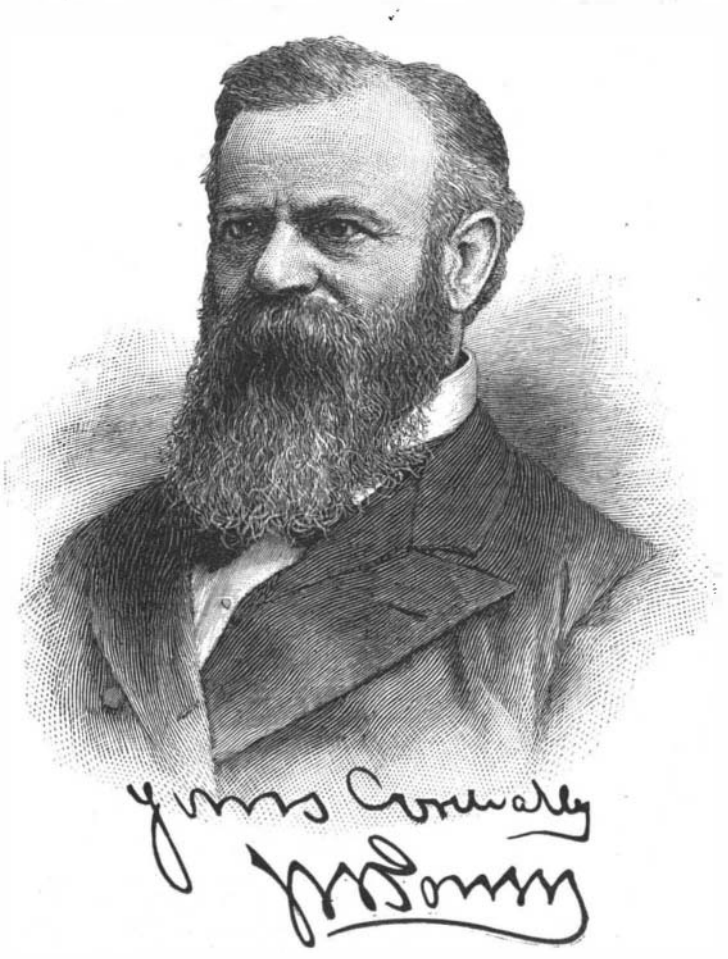
"Our ornithological rambles during this, our second visit to Meimbun, were productive of several species which we had not previously obtained; among others of two or three rare pigeons. Of all parts of the world, the New Guinea region is perhaps the richest in these birds, but we found them tolerably abundant here, and obtained no less than eleven different kinds. But our greatest prizes were two birds hitherto unknown to ornithologists. The first, a bush shrike of brilliant coloring, with the head and shoulders shining bluish black and the rest of the plumage bright orange yellow, I afterward named after the yacht, *Pericrocotus marchesæ*. The other bird (*Macronus kettlewelli*), a babbler, with a curious tuft of white, hair-like feathers springing from the back, was an interesting species, of which we unfortunately obtained a single specimen only." Of this we give an engraving.

THE Tay Bridge, Scotland, is over two miles long, has 86 piers, and spans varying from 58 to 245 feet.

JOHN WESLEY POWELL.

The American Association for the Advancement of Science is migratory. In 1887 it met in New York; in 1888 it gathers its members in Cleveland. A new president, representative as a leader in some special branch of science, is chosen each year. Biology, physics, chemistry, anthropology, and other sciences have been selected in turn. Last year the astronomer Samuel P. Langley* held that office, and this year he yields the place to a distinguished ethnologist.

John Wesley Powell was born in Mount Morris, N. Y., March 24, 1834. He is the son of a Methodist clergyman, and passed his early life in different places in Ohio, Wisconsin, and Illinois. Unable to pursue a systematic college course, he studied at Illinois College and at Wheaton College, meantime teaching at intervals in public schools, and finally he spent the years 1854–56 at Oberlin College, where he followed a special course. His early inclinations were toward the natural sciences, and he began with botany, making collections of various plants. This led him into roving habits, and he made scientific excursions on the Mississippi to St. Paul and across the Wisconsin to Mackinaw. In 1856 he descended the Mississippi in a skiff, from the Falls of St. Anthony to its mouth, and in 1857 he rowed from Pittsburg to the mouth of the Ohio. A year later he went from Ottawa, Ill., down the Illinois River to its mouth, and then ascended the Des Moines River. On all of these trips he made collections of specimens, which he disposed of to various institutions of learning in Illinois, who had come to depend on him for material with which to illustrate their lectures on natural history. He was elected secretary of the Illinois State Natural History Society, and given special advantages for continuing his researches.



At the beginning of the civil war he enlisted as a private in the 20th Illinois Volunteers, and when he reached the rank of lieutenant he was transferred to Battery B of the 2d Illinois Artillery, of which he became captain. He was promoted major and lieutenant-colonel and declined a commission as colonel. He lost his right arm at Shiloh, but on his recovery returned to the front and remained in active service until the close of the war.

In 1865 he accepted the professorship of geology and office of curator of the museum in the Iowa Wesleyan University, but soon resigned to take a similar post at the Illinois Normal University. During the summer of 1867 he visited the Rocky Mountains with his class in geology, thus inaugurating the practice since followed by teachers elsewhere. This success led to his desire to explore the great Colorado River of the West.

The success of his explorations led to his recognition by the government, and in 1870 Congress established a topographical and geological survey of the Colorado River of the West and its tributaries, which was placed under his direction. During the following years a systematic survey was conducted until the physical features of the Colorado valley, hitherto an unknown country, embracing an area of nearly 100,000 square miles, became thoroughly explored. This expedition, originally conducted under the auspices of the Smithsonian Institution, was subsequently transferred to the Department of the Interior and given the title of the Geographical and Geological Survey of the Rocky Mountain Region.

The existence of four separate surveys in the Western Territories conflicting somewhat with each other, and under different departments, resulted, in 1879, in their consolidation, forming the United States Geological Survey, of which Clarence King was appointed director. From the beginning of the controversy* Major Powell was the leading advocate of the consolidation. He represented the Department of the Interior before the committee of the National Academy of Sciences to whom the matter had been referred by Congress for its consideration, and his lucid statement before that body was, perhaps, the most powerful argument showing the necessity of consolidating the surveys that the committee received.

While exploring the Colorado valley he became deeply interested in the remains of the ancient cities of the Moquis, and, next to geology and topography, he made ethnology the chief object of his expedition. The material that he collected on this subject had been deposited with the Smithsonian Institution, and when his survey was stopped, three volumes of "Contributions to North American Ethnology" had been issued, and eight more were in course of preparation.

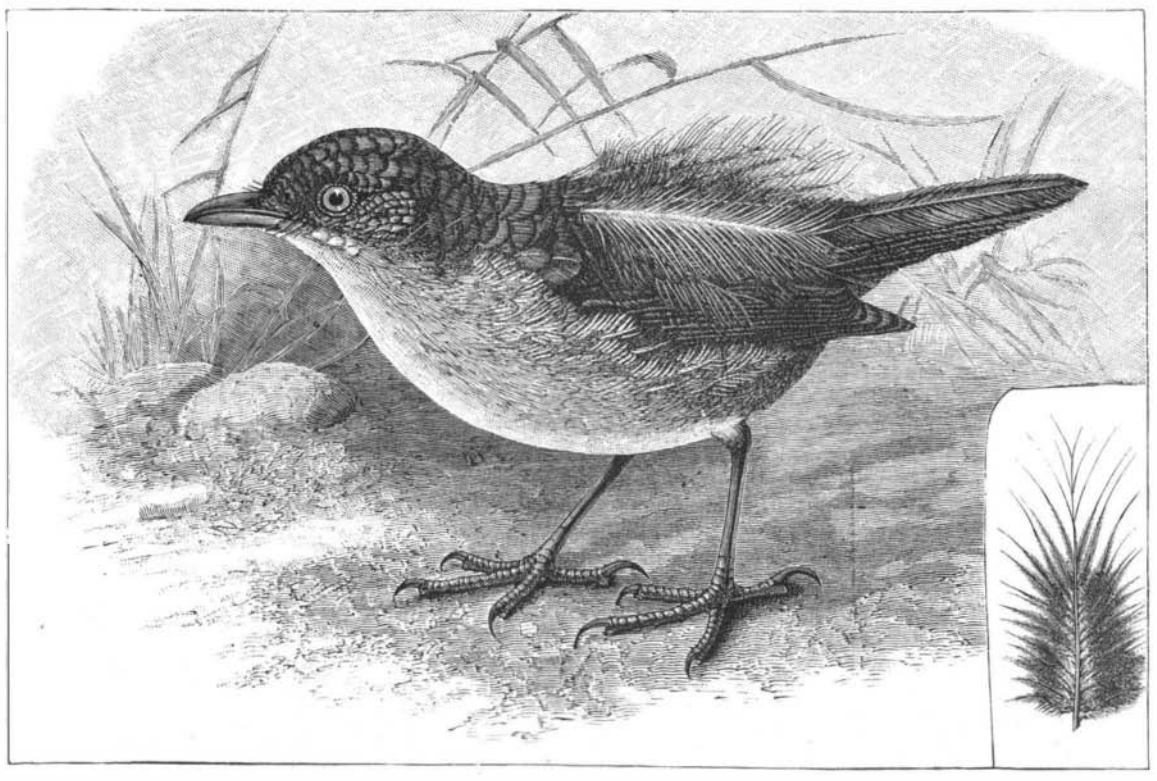
In order to prevent a discontinuance of this work, a Bureau of Ethnology, which has become the recognized center of ethnographic operations in the United States, was established under the direction of the Smithsonian Institution. An appropriation of $20,000 was secured in 1879, and Major Powell was given charge of the work, and has since continued at its head, issuing annual reports, beginning with the volume for 1879–80, and a series of monographs on special topics.

In 1881 Clarence King resigned from the directorship of the United States Geological Survey, and President Garfield at once appointed Major Powell to that place. He has since filled that office, ably administering the work of the greatest survey of the world.

In 1879 the survey was organized by Mr. King on a geographic basis, but with that remarkable power of system so characteristic of its present chief, it has been gradually reorganized, until at present nearly all of the work is classified by kinds. Geology, paleontology, chemistry, and geography are assigned to separate divisions. The geology is subdivided, partly by the nature of the phenomena, as

* See the sketch of Samuel P. Langley, in the SCIENTIFIC AMERICAN for August 20, 1887.

* A description of the early history of the national surveys is given in the sketch of Ferdinand V. Hayden, contained in the SCIENTIFIC AMERICAN for January 7, 1888.



MACRONUS KETTLEWELLI.

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