LOCOMOTIVE HISTORY AT THE WORLD'S FAIR, ST. LOUIS.

BY HERBERT T. WALKER.

Not the least important and interesting section of the Transportation Exhibit at the World's Fair at St. Louis is the remarkable collection of old locomotives, that present a graphic history of the development of transportation by steam from its earliest inception down to the present day.

It will be remembered that some time prior to the opening of the Columbian Exposition in 1893, Major J. G. Pangborn, representing the Baltimore & Ohio Railroad Company, visited Europe and acquired a large number of drawings and other data of early locomotives. He also secured like material from the railroads and engine builders of the United States; and from this rich mine of information, full-size reproductions of nearly all the types of locomotives were constructed. Furthermore, wherever possible, specimens of real locomotives were secured, and these with the full-size reproductions formed, at Chicago, a unique exhibit which presented an almost unbroken chain in the history of the locomotive engine.

On the closing of the Columbian Exposition, the collection was removed to the Field Museum, and thence it was recently transferred to St. Louis, at which time additional historical material was collected, thus supplying the missing links, and forming a chain of locomotive history that is practically complete, presenting the matter to the student in a way that enables him to grasp the subject as no written work would do.

The history of the locomotive is a difficult and complex subject, and one, moreover, that has never been written in book form. The value, therefore, of this historical display, from an educational standpoint, can scarcely be overestimated.

It would be impossible to do justice to the elaborate exhibit, now at St. Louis, within the limits of a single notice; and, as illustrated articles on these historical locomotives have appeared in this journal from time to time, it will suffice for the general reader if we glance at a few of the more noteworthy examples.

Before describing the engines which we illustrate, mention should be made of the fact that all the engines stand upon either the original or the exact counterpart of the track of their period; and that, in many instances, lifelike figures of the contemporary enginemen have been mounted on the footplates.

These two features of the engines lend additional historical flavor to this most valuable collection.

Fig. 1 of the accompanying illustrations shows the commencement of one line of the Historical Exhibit, and the object before us is a model of Sir Isaac Newton's suggestion, made in the year 1680, for a vehicle to be propelled by a jet of steam working on the reaction principle utilized in the famous Turbine of Hero of Alexandria in the year 150 B. C. It is needless to say this idea was never put into practical form.

The next exhibit is an enlarged reproduction of Murdock's road locomotive of 1784, and is the first engine shown in Fig. 2. Murdock's engine was a small brass model, which worked satisfactorily on a table or floor; but the reproduction at St. Louis is made larger, and, as seen in Fig. 6, the figure of an engineer has been placed thereon. Murdock's engine had but three wheels, and was worked by a single cylinder and a grasshopper beam.

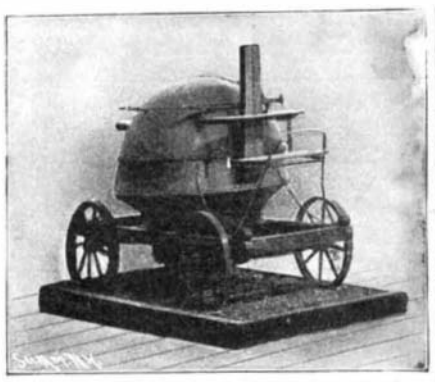


Fig. 1.—Sir Isaac Newton's Proposed Locomotive, 1680.

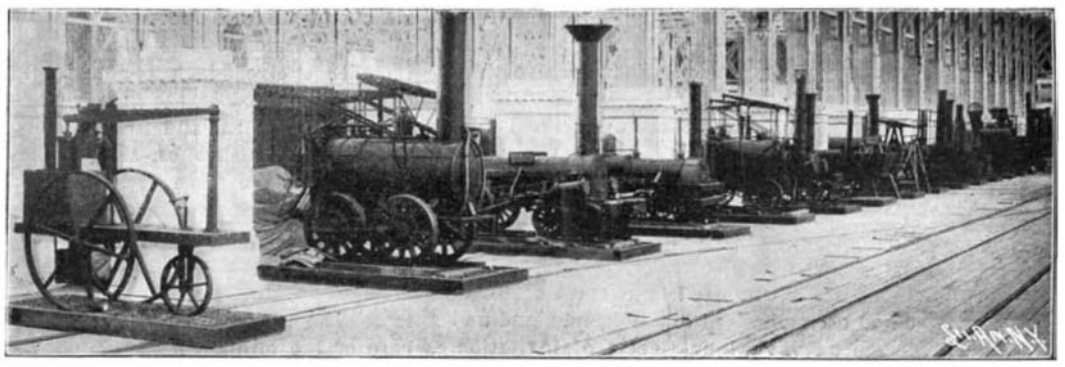


Fig. 2.—A Portion of One Line of the Historical Exhibit at the World's Fair.

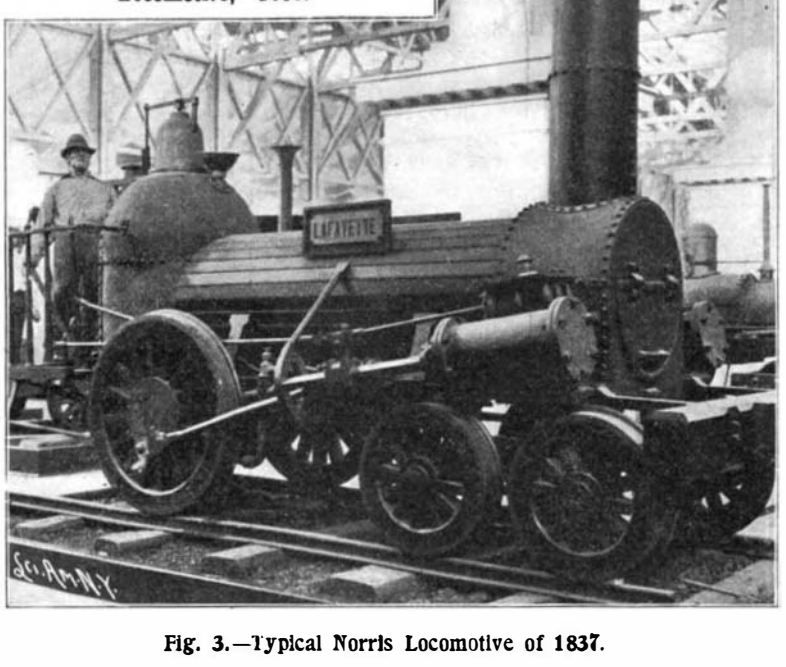


Fig. 3.—Typical Norris Locomotive of 1837.

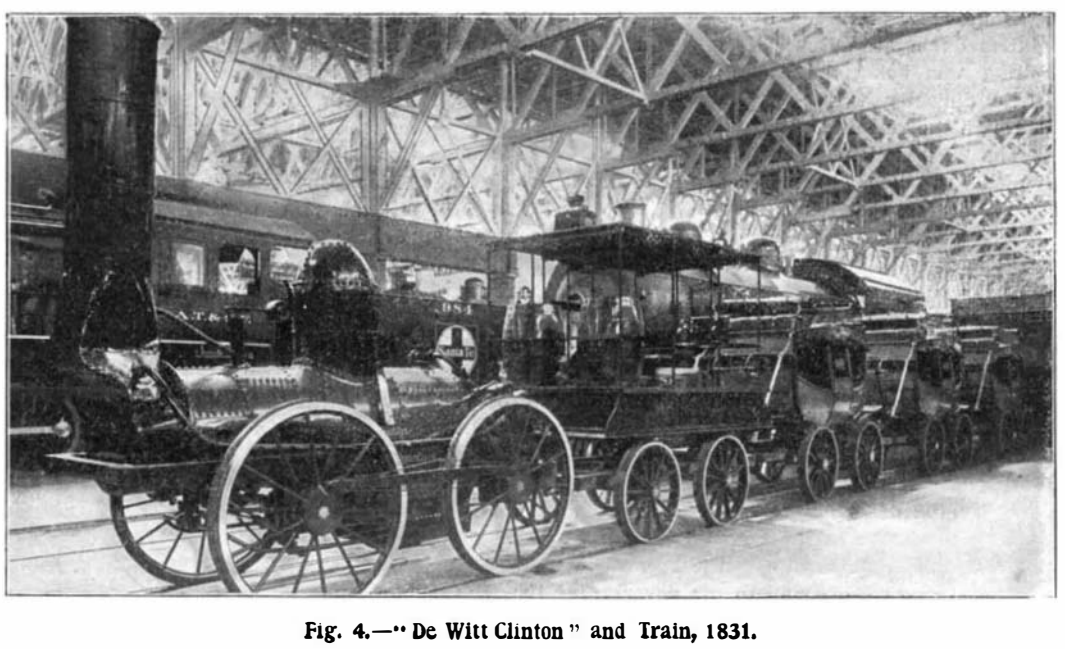


Fig. 4.—"De Witt Clinton" and Train, 1831.

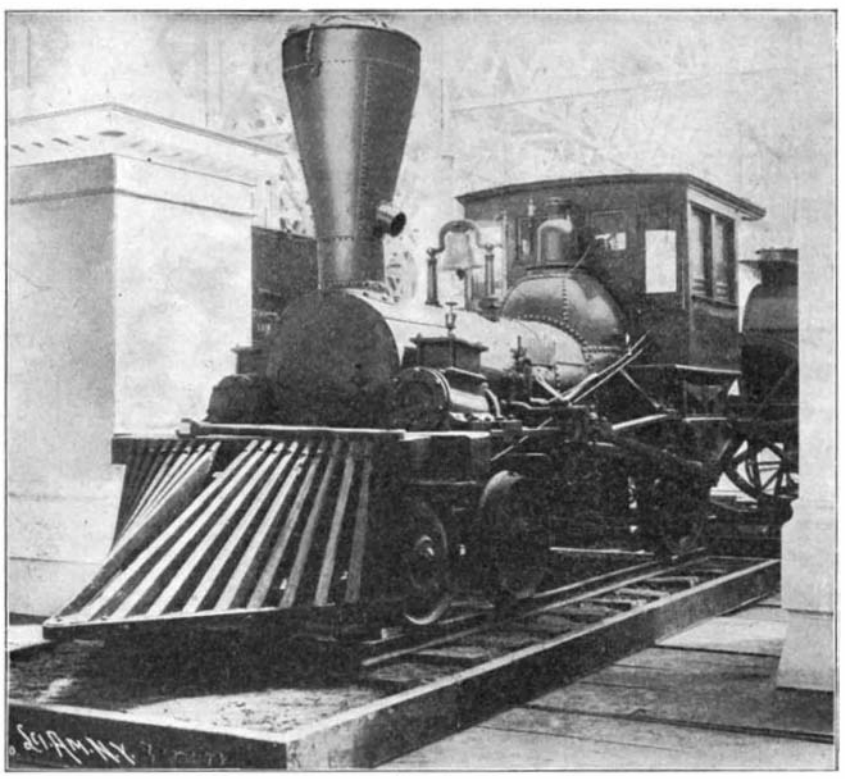


Fig. 5.—The First Locomotive in Chicago, 1848.

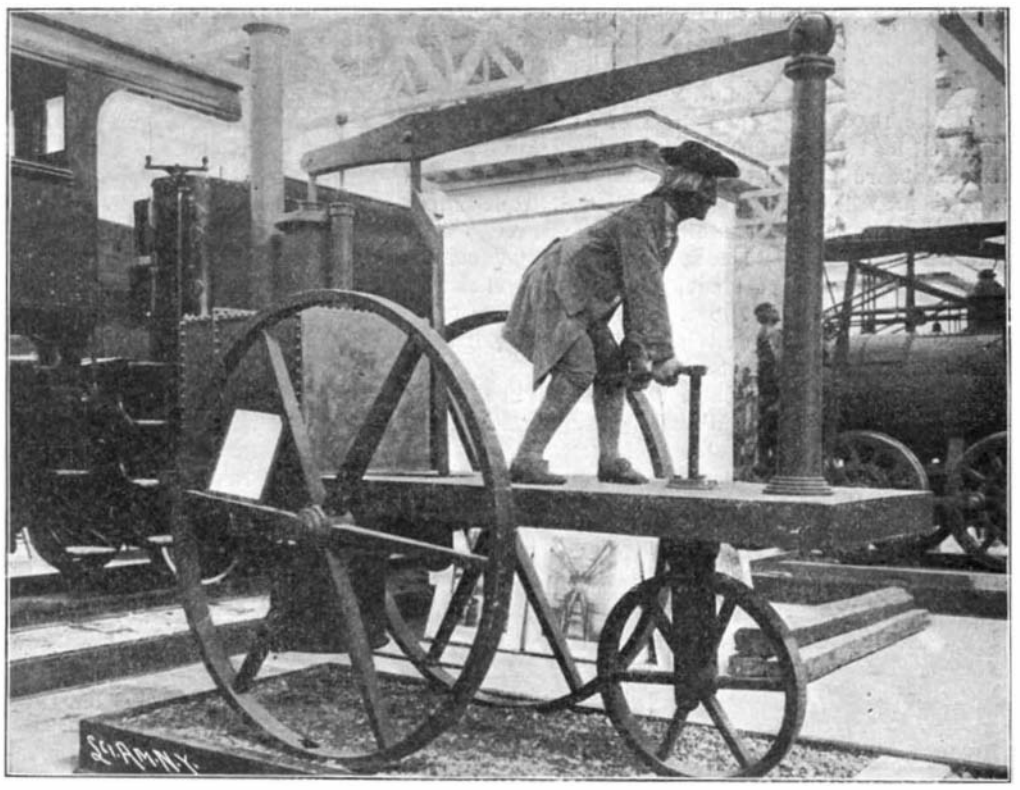


Fig. 6.—Murdock's Road Locomotive, 1784.

The second engine, appearing in Fig. 2, is a full-size reproduction of the "Stourbridge Lion," the original of which was built in England in 1828, and was run on the Delaware & Hudson Canal Company's railroad. This engine had grasshopper beams, and was the first locomotive to turn a wheel in the United States.

We next observe "La Fayette" of 1837. This was one of the first Norris locomotives that had adhesion sufficient to surmount heavy grades, and, as seen in Fig. 3, a figure of an engine driver with one hand on the throttle lever and the other holding the reversing lever has been placed on the footboard, giving a realistic finish to this pioneer American engine, which, with

its drop "D" hook motion and dome firebox, will repay careful study.

The fourth engine shown in Fig. 2 is the "Experiment," designed by John B. Jervis in 1832 for the Mohawk & Hudson Railroad. It was the first engine to have a swiveling truck—a feature of the American locomotive that has helped to make it so successful.

Then follows in the line the "Puffing Billy," a celebrated English locomotive designed by Blackett and Hedley in the year 1813, for hauling coal trains on the Wylam Colliery Railway, Newcastle-on-Tyne. It has upright cylinders and grasshopper beams, similar to the "Stourbridge Lion," already noticed.

The rest of the engines shown in this illustration become too indistinct in the perspective to be clearly seen, but among them will be found Eastwick and Harrison's "Hercules" of 1837-38, the first locomotive to have equalizing levers; the first American eight-wheel engine, designed by Campbell in 1836; James' engine of 1832, the first engine in the world with link motion, and many others of equal interest. Limitations of space forbid more than a brief reference to one of Ross Winans' celebrated "Camel" engines, that astonished the railway world fifty years ago with its great hauling power. We must not, however, pass by a full-size reproduction of Stephenson's "Rocket" of 1829, which at the celebrated competition at Rainhill, England, attained a speed of 24 miles an hour. It possessed all the essential features of the modern locomotive, and is, perhaps, the most important historical locomotive in the world.

In other parts of the historical display will be found several engines worthy of notice, among them the "Pioneer" of 1848. (See Fig. 5.) This is a working locomotive. It was the first locomotive seen in Chicago, and ran on a railroad that is now a part of the Chicago & Northwestern system. It weighs about 10 tons, and has inside cylinders. The eccentrics are outside, and are fitted with drop "V" hooks. This feature alone makes the engine of special interest.

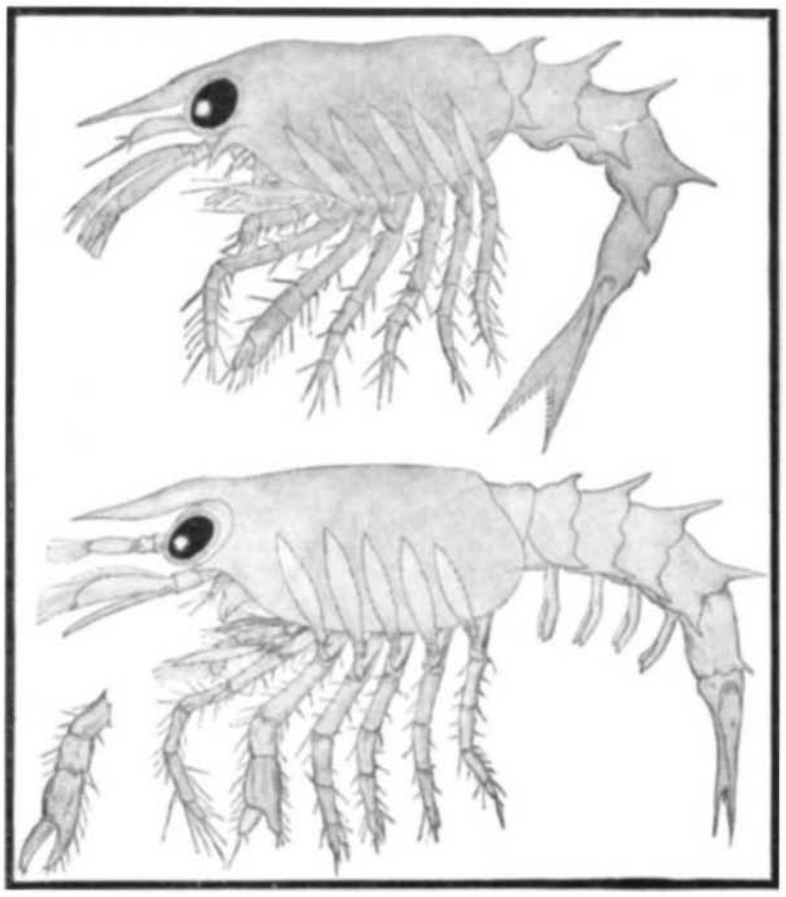
Perhaps the best specimen of a full-size reproduction to be found in the whole display is that of the "De Witt Clinton," which was the first engine to draw a train in the State of New York. The original was built for the Mohawk & Hudson Railroad, now a part of the New York Central & Hudson River Railroad, in the year 1831. This exhibit is complete, as it includes the tender and three passenger cars, and is illustrated in Fig. 4. It will be observed that these cars are built on the lines of the old stage coach. The baggage was carried on the roof, and an outside seat was provided for the guard or conductor.

Passing over the rest of the engines in this great exhibit, it may be said in conclusion that the Baltimore & Ohio Railroad Company have supplemented it by the addition of several modern locomotives of the most approved design, including the Mallet articulated compound engine, which has the distinction of being the heaviest locomotive ever built. It has four cylinders and twelve driving wheels arranged in two sets of six wheels each, the frame for the front set of wheels being pivoted to the rear section of the frame, thus enabling the engine to round the sharpest curves with ease. The total heating surface of this mammoth machine amounts to 5,586 square feet—the largest heating surface ever put into a locomotive. Its enormous power may be conceived in the drawbar pull of 70,000 pounds which it exerts when working compound, but when in simple gear the tractive effort reaches over 80,000 pounds. The weight of the engine in working order is 334,500 pounds.

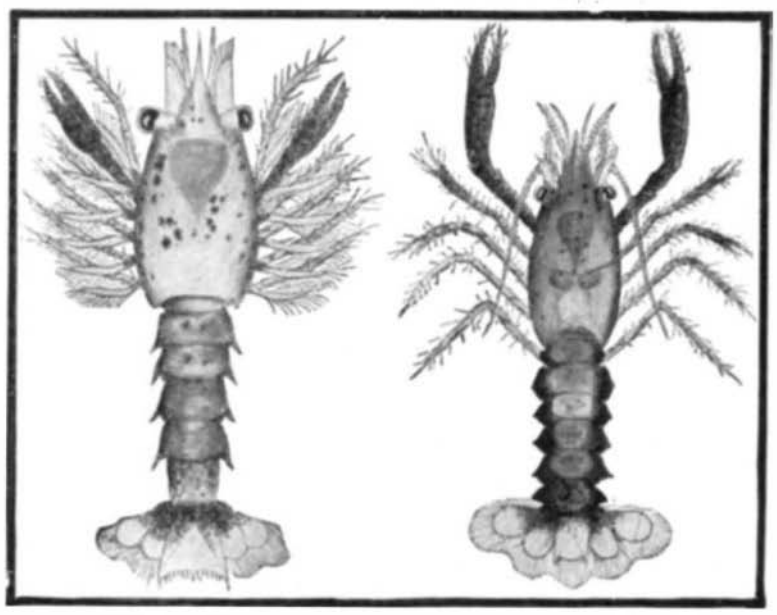
A good idea of the great increase in the size and power of locomotives since Stephenson's time may be obtained by comparing his engine with the one just described. The total heating surface of the "Rocket" was 137.75 square feet; its drawbar pull was about 785 pounds, and its weight in working order was but a little over 9,000 pounds.

It is gratifying to know that this valuable collection will not (as at one time seemed possible) be broken up at the close of the St. Louis Fair, arrangements having been practically completed for placing it in a permanent home in one of the eastern cities, with ample provision for its subsequent safe keeping.

First Stage—A Few Days After Hatching from Egg.



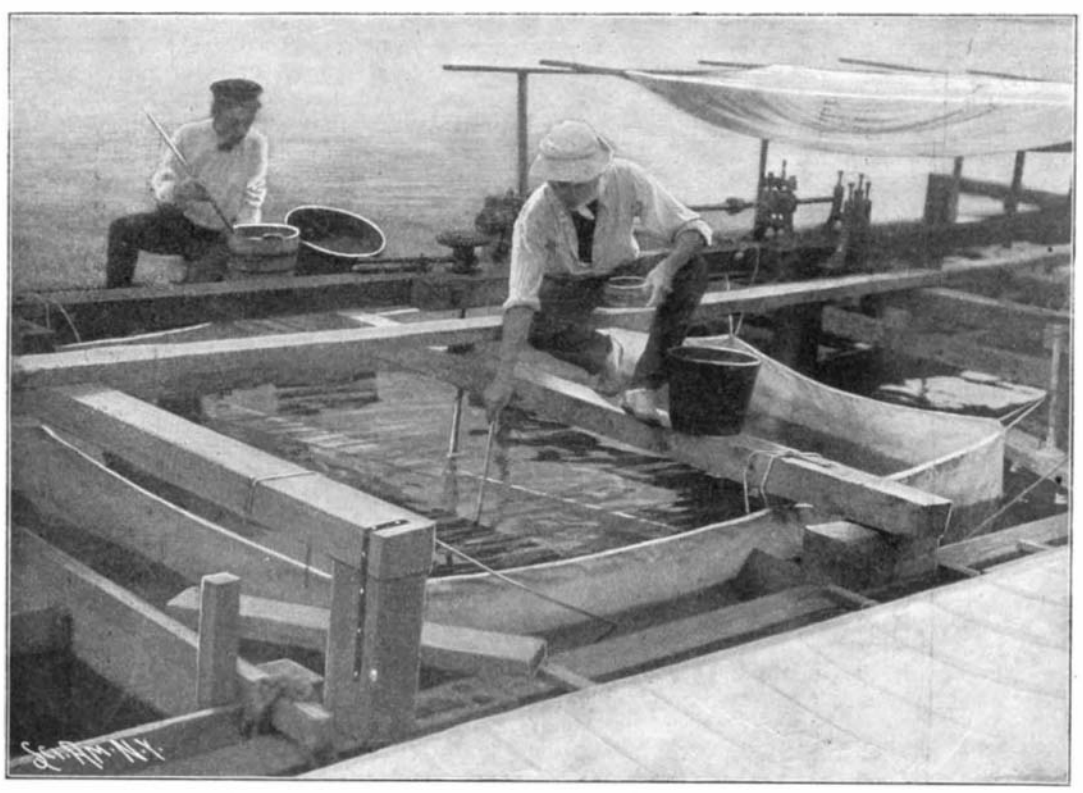
Second Stage in the Growth of a Lobster.



Third Stage—Nearing Maturity.

Fourth Stage (Last)—Young Lobster Ready for Liberation.

The Four Stages in a Lobster's Life.



Submerged Bag with Stirrers for Breeding Lobsters. Getting Out "Fourth-Stagers" for Liberation.

ARTIFICIAL PROPAGATION OF LOBSTERS.

BY WALTER L. BEASLEY.

The artificial propagation of lobsters, one of the most interesting of biological problems, and of great economical importance to the United States, has been successfully solved. This noteworthy discovery, which has baffled scientists up to the present, has been practically worked out by the Rhode Island Commission of Inland Fisheries through the investigations carried on by Dr. A. D. Mead, of Brown University, who is director of the floating laboratory of the Commission at Wickford, R. I. The U. S. Fish Commission also co-operated in these experiments. For the past three years or more this has been anchored in Mill Cove and turned into a lobster experimental station, with specially-devised apparatus, and is to-day the first successful lobster-hatching plant in the world. New life is now assured to the declining lobster industry, which otherwise seemed doomed to extinction. The annual output is smaller each year, due partially to the unceasing trapping and reckless destruction of the female egg and short lobsters by certain of the crafty and ignorant fishermen, who fail to observe the regulations, and evade the fishing laws. It should be stated, however, that early experiments were carried on on behalf of the United States Fish Commission at Wood's Holl in 1899-1900 by Prof. Herman C. Bumpus, then director of the United States Biological Laboratory. His series of promising investigations awakened general interest in the artificial rearing of lobsters, and many different devices for the inclosures were tried, all of which proved unsatisfactory and resulted more in killing than in the rearing of the lobster fry. Later the experiments were transferred to the Wickford Station. The writer, in July of this year, at the Wickford Laboratory, had the opportunity of visiting the lobster-hatching plant, when Dr. Mead outlined the apparatus and his successful method of rearing the young lobsters from the eggs through the critical four stages of two to three weeks which is necessary before they become fitted for the struggle for existence. The following narrative embodies the salient and latest features of Dr. Mead's investigations, obtained from an interview and his official report. The hatchery is installed in a house-boat, some fifty feet in length, built on two pontoons, having a house ten by ten on each end, which is used for a laboratory, sleeping apartments, and the storing of appliances. A well of twenty feet is arranged between the two houses. Two large floats on both sides of the house-boat contain the essential apparatus for the breeding and rearing of the young fry. This, the most vital and important feature of the whole work, viz., the inclosure used to harbor the young fry, consists of a stout canvas bag twelve feet square, submerged to the depth of four feet and supplied with a rotating propeller. After innumerable experiments, it was found that the keynote to success was that the water in which the young fry were inclosed should be kept in continuous motion. This accomplishes two things: it prevents the fry from settling into pockets to smother or devour one another, and it keeps food in suspension, so that they can obtain it. In order to admit a free circulation of water in these bags, windows of copper screens are placed in the bottom and in the sides near the top. The bottom ones are twenty by thirty inches, through which the water enters the bag. The side ones are five feet long and ten inches broad, and placed ten inches from the top, through