

*The shad fishery.*—The river fisheries of commercial importance are confined to the Saint John's River, where shad are taken by gill-nets in considerable numbers. The season for shad being earlier here than at other points on the Atlantic coast the catch is sometimes very profitable to the fishermen, and many men look to this fishery for support. During the last few years, however, the catch has been small, and the supply seems to be somewhat exhausted.

*The oyster fishery.*—There is a large supply of good oysters, it being estimated that there are more than 12,800 acres of edible oysters in the waters of Florida. They occur in natural beds in the salt and brackish waters of the bays of the northern parts of the State, on the east and the west coasts. Along the shores of the southern part of the peninsula are large reefs of a small oyster known as "coon oyster" or "tree oyster," the latter name referring to their growing upon the tide-washed roots of the mangrove. These oysters are so small that they have no commercial value. The only method of gathering oysters in Florida is by using the ordinary oyster-tongs. Appalachicola has recently been doing a thriving business in canning the excellent oysters of that vicinity. Most of the fresh oysters of Florida are consumed locally.

PENSACOLA, FLA., October 15, 1885.

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**135.—NOTES ON THE HISTORY OF PREPARING FISH FOR MARKET BY FREEZING.**

**By A. HOWARD CLARK.**

For very many years in Russia and in other cold countries fish and meats have been frozen for market by exposure in the open air or by freezing them *en masse* in ice. In Thibet as early as 1806 the flesh of animals was preserved frost-dried—not frozen—and in that condition would keep, without salt, for several months.

In the United States ice was first used for the preservation of fish about the year 1842, and in 1845 fishing-vessels began to take ice to preserve their catch. At first they were careful to keep the ice separate from the fish, piling it in a corner of the hold, but they soon began packing the fish in broken ice. The inland trade in fresh fish had, up to that time, been very limited, but soon increased, and it was not many years before boxes of fish packed in ice were shipped far inland.

The trade in fish frozen by artificial means began about the year 1861, when Enoch Piper, of Camden, Me., obtained a patent (No. 31736) for a method of preserving fish or other articles in a close chamber by means of a freezing mixture having no contact with the atmosphere of the preserving chamber. The patent was issued in March, 1861. Mr. Piper states that the most important application of his invention is for the preservation of salmon, which had heretofore been preserved in a fresh state only by being packed in barrels with crushed ice, which on

melting had moistened and injured the fish. The ice, it was said, could not keep the fish more than a month, whereas, by the new method they could be kept for years if need be. The apparatus used is described as a box in which the fish are placed in small quantities on a rack; the box has double sides filled in between the sides with charcoal or other non-conducting material. Metallic pans filled with ice and salt are set over the fish and a cover shut over the box. About twenty-four hours were required to complete the freezing, the freezing mixture being renewed once in twelve hours. "The fish may afterwards be coated with ice by immersing them in iced water or by applying the water with a brush. They may then be wrapped in cloth and a second coating of ice applied, or they may be coated with gum-arabic, gutta-percha, or other material to exclude the air and to prevent the juices from escaping by evaporation." The fish are then packed closely in a preserving box, which is without a cover, but within a covered box, the space between the boxes being filled with charcoal or other non-conductor. Metallic tubes pass through the inner box for the introduction of the freezing mixture, a small pipe connecting with the lower end of the tubes to carry off the brine. The combined area of the tubes is required to be one-fifth the area of the inner box in order to keep the temperature below the freezing-point.

Numerous and complex methods of fish-freezing have been invented and more or less practiced since Mr. Piper obtained his patent. The latest improvements are the simplest and perhaps the most effective.

In 1869 Mr. William Davis, of Detroit, patented a freezing-pan for fish, which he describes as a thin sheet-metal pan or box, in two sections, one made to slide over the other, the object being to place the fish or meat in one section or part and to slide the other part over it and in close contact with the articles to be frozen. The boxes are then to be piled in a large close wooden box, the double sides of which are filled in with charcoal or other non-conducting material. Ice and salt is packed over and about the metal pans. In from thirty to fifty minutes the contents are frozen solid and may be taken from the pans and packed in the keeping chamber, where the temperature is constant at  $6^{\circ}$  to  $10^{\circ}$  below the freezing-point.

Mr. Davis in the same year obtained another patent for a preserving chamber, which he says may be a room or box of any desired form. It has double walls, with the intervening space filled with a non-conducting substance. Within this are metal walls of less length than the outside walls, so that between the two a freezing mixture may be placed. Entrance is obtained through the top or side by closely-fitting doors or hatches.

Other methods have been practiced, such as putting the fish in rubber bags or in other waterproof material and packing them in ice and salt. One method is described as a series of circular pans, seven in number, of such dimensions as to fit in a barrel, and in these pans the fish

are frozen. In 1880 Mr. D. W. Davis obtained a patent (226390) for packing fish and finely-crushed ice in a barrel and freezing the same solid, the fish being so stowed as not to come in contact with one another.

In Boston, New York, and other cities entire buildings of three to five stories or floors are now made into fish-freezers and cold storage for fish. The most common method of producing the cold air requisite for freezing is by the use of ice and salt in metallic chambers or large tubes, which pass perpendicularly through the freezing-room. The freezing-room is provided with double walls interlined with some non-conductor. The fish are either hung on hooks or spread on shelves until frozen, when they are removed to the cold storage-rooms and kept for months, if need be, before marketing.

WASHINGTON, D. C., *March 27, 1886.*

**136.—A LIST OF THE BLANK FORMS, CIRCULARS, AND MINOR PUBLICATIONS OF THE UNITED STATES FISH COMMISSION, FROM AUGUST 1, 1884, TO MARCH 1, 1887.\***

**By CHARLES W. SCUDDER.**

501. Blank book for record of salmon and alewives taken. 8 columns. August 6, 1884. 1 folio, 17 by 20.5 cm. Bound. 12 folios.

502. Blank requesting Smithsonian Institution to forward Fish Commission publications to parties named. August 8, 1884. 1 p. 9.5 by 17 cm.

503. Blank for inclosing vouchers for certification. September 9, 1884. 1p. 20 by 26 cm.

504. Blank for compiling the names of carp applicants by Congressional districts. 7 columns. Reprint of No. 320. October 20, 1884. 2 pp. 20 by 25 cm.

505. Blank for sworn certificate of traveling expenses. October 30, 1884. 1 p. 16.5 by 20 cm.

506. Blank book for liabilities of the U. S. Commission of Fish and Fisheries. 7 columns per folio. November 4, 1884. 1 p., 20 by 25 cm. Bound. 28 pages.

507. Blank book for record of temperatures and soundings for the steamer Albatross. 16 items. 5 columns. November 7, 1884. 1 p., 11 by 24 cm. Bound. 100 pages.

508. Blank for return for directory of Fish Commission employees. 8 items. December 5, 1884. 1 p. 20 by 25 cm.

509. Blank book for quarterly balance of property of the U. S. Fish Commission. 12 items. 24 columns. December 2, 1884. 1 p. 20 by 31 cm.

510. Blank for memorandum to Professor Baird for approval. December 17, 1884. 1 p. 20 by 25 cm.

511. Blank label to attach to Fish Commission publications. December 30, 1884. 1 p. 7.5 by 14 cm.

512. Blank book for articles on hand at close of quarter. 22 columns. January 1, 1885. 1 p., 33 by 45 cm. Bound. 300 pages.

513. Post-card referring applicants for Fish Commission Bulletin to their members of Congress. January 6, 1885. 1 p., and penalty notice on reverse. 7.5 by 13 cm.

514. Letter heading "Laboratory of the U. S. Commission of Fish and Fisheries, Washington, D. C." December 30, 1884. 1 p. 20 by 25 cm.

\* This is a continuation of the list in Fish Commission Bulletin, Vol. IV, p. 397.