### FIN KEEL CENTERBOARD FOR ONE-RATER.

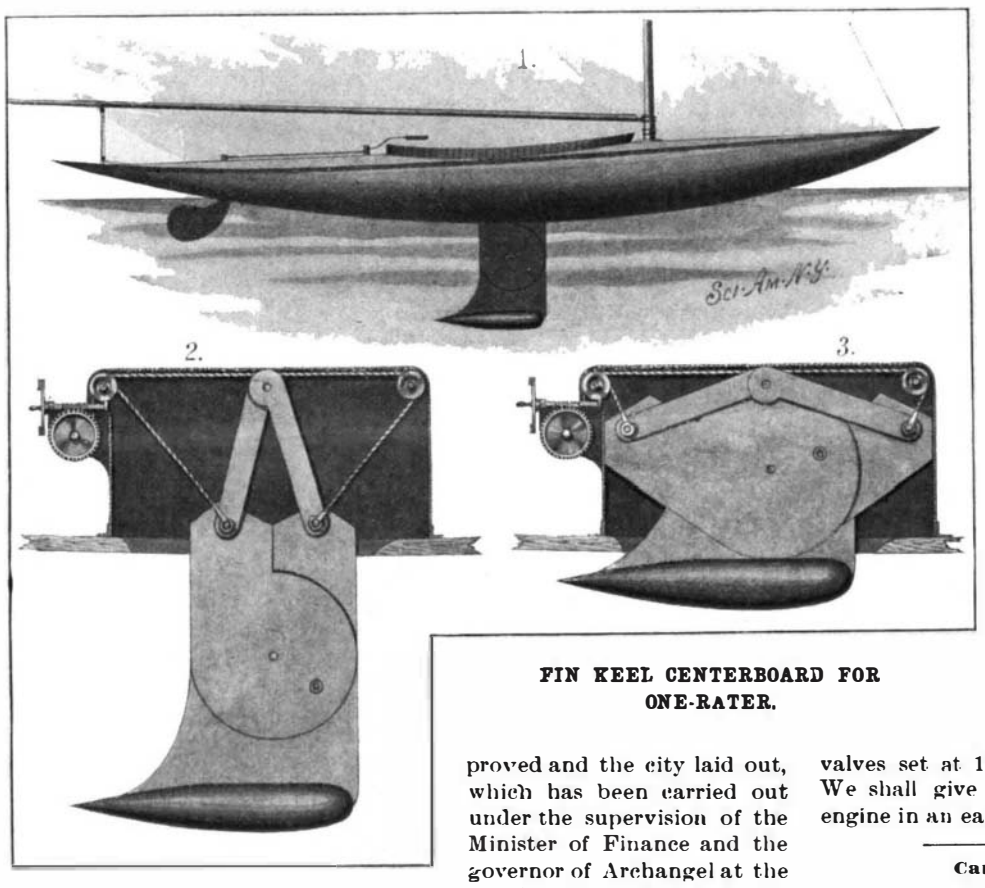
In the earlier days of international yacht races, the struggle was more distinctly one between types than it is to-day. The advocates of the wide, shallow hull, with its lifting centerboard, and the deep, narrow hull, with its fixed keel carrying a mass of lead on its lower end, were firm believers in the superior advantages of their favorite and widely divergent types. It was claimed for the American centerboard sloop that its wide beam, small displacement, big sail plan and narrow board dropped down to grip the deeper water and hold the craft up to the wind, was the ideal craft for speed and convenience. On the other hand, the advocates of the cutter type pointed with pride to the staunchness and weatherly qualities of the deep keel, outside-ballast craft, with her snug sail plan, lofty and unobstructed cabin, and fine heavy weather qualities.

The centerboard craft always was and always will be popular on a coast like our own Atlantic coast, where many of the harbors are shallow, because of the ease with which the draught can be lightened by merely lifting the board, and the yacht be taken into an anchorage which would be inaccessible to the cutter with her deep, fixed keel. On the other hand, the enormous stiffening effect of that lump of lead, hung many feet below the waterline, was for years the object of covetous regard on the part of the centerboard skipper.

It was only a question of time when an attempt would be made to combine the sliding keel with the outside lead, and of late years, in the smaller boats, some very ingenious combinations for this purpose have been brought out. One of the difficulties attendant on weighting a centerboard of the ordinary triangular shape is the change in the trim of the boat which occurs when it is drawn up. To preserve the trim, the keel should lift vertically instead of swinging on a forward hinge.

We have been favored by Mr. H. W. Fairbrass, of London, with a drawing of an ingenious lifting bulb keel, in which a true vertical lift is accomplished by making the keel-plate in three jointed portions, the upper two of which work on a central pivot somewhat after the manner of a pair of scissors, the lower portion of the plate, carrying the bulb, being hung from the same pivot. Two jointed arms pivoted at their upper extremities at the top of the centerboard casing, and at their lower ends to the two upper sections of the keel-plate, together with a pair of hoisting ropes, complete the toggle joint arrangement by which the plate shuts up within the casing. The hoisting ropes are wound upon a drum outside the casing, which is operated by a worm and wheel.

In the drawings the keel is shown applied to a one-rater, and the dimensions, weight, etc., for a boat of this size are as follows: The casing measures 2½ feet in height. 4½ feet in length, and 1 inch in width. The width of the plates is 2½ feet and the total drop of the keel 4 feet and the exposed area is 10½ square feet. The lead bulb is 8 inches in depth by 4 feet in length and its weight about 800 pounds. The members of the keel plate, it should be noted, are held in a true longitudinal plane by means of a pin which is riveted firmly to the left hand upper section of the keel and moves in radial slots cut in the right-hand and lower sections. The plates are recessed into each other as far as practicable so as to reduce the projecting edges and present as little resistance as possible to the water.




FIN KEEL CENTERBOARD FOR ONE-RATER.

### A Record Year for Manufactures.

American manufacturers made their best export record in the fiscal year just ended. Not only were their exportations larger than in any preceding year, but for the second time in the history of our foreign commerce they exceeded the value of the imports of manufactures. In the fiscal year 1898, for the first time in the history of the manufacturing export trade, the exportation of manufactures exceeded the importation of manufactures, the total value of exports of manufactures being about 25 per cent in excess of that of imports of manufactures. In the fiscal year 1899, however, despite the increase in imports of manufactures, the total exportation of manufactures was 30 per cent greater than the importation of manufactures, being $338,667,794, against $259,570,293 of imports of manufactures.

Prior to the fiscal year 1898, imports of manufactures were always greater than exports of manufactures. From 1888 to 1897 imports of manufactures ranged about $1,000,000 a day, with the single exception of 1894. During all that time the exportation of manufactures was steadily increasing, so that in 1897 they amounted to $277,000,000, against $130,000,000 in 1888, having thus more than doubled in that period. In 1898 they were $290,697,354, and in the year just ended, as already indicated, $338,667,794. It was not until 1898 that through the combined reduction of imports and increase of exports the tide turned in favor of American manufacturers, and in that year the total exports of manufactures were, for the first time, greater than the imports of manufactures, being $280,697,354, against $230,897,676. In the fiscal year 1898, the exports of manufactures exceeded the imports by $59,799,678, and in 1899 the exports of manufactures exceeded imports of manufactures by $79,097,501.

### A Russian Arctic Port.

A new port was opened July 5, 1899, near the Catherine Harbor, the extreme northern part of Russia's possessions. The city will be called "Alexandrovsk" in honor of the late Emperor. He sent his Minister of Finance to visit the northern coast in 1894. The Minister reported that the location of a city at a point where a good harbor could be found was necessary to the development of the Mourman region. Kola, the principal commercial town of that region, is on a narrow, shallow gulf, and is inaccessible to ordinary vessels, and thus forces the trade of the north of Russia to seek Norwegian ports. The Catherine Harbor was found to be located near the center of the marine industries of the Mourman coast, with ample depth to admit the largest steamers, and it is a curious fact that the Gulf Stream keeps it from freezing during the winter. In 1896 the Emperor ordered this harbor improved and the city laid out, which has been carried out under the supervision of the Minister of Finance and the governor of Archangel at the small cost of $250,000, inside of five years from the time that the improvement was first suggested. Work was begun only three years ago. Consul-General Holloway states that the new port of Alexandrovsk will soon become an important center for the industries of northern Russia, as it is capable of enormous development.

### Dust from Africa in Europe.

At the suggestion of Prof. E. Ray Lankester, Lieut. A. G. Froud has sent us a copy of a report by G. T. Prior upon some fine brown dust collected on board the Peninsular and Oriental steamship "Sumatra" during a thunderstorm in the Galita Channel, in the Mediterranean. The dust contained about 33 per cent of doubly refractive grains, composed chiefly of carbonates of calcium, magnesium and iron. After treatment with hydrochloric acid, the insoluble residue was for the most part without influence on polarized light, and consisted mainly of silicate of alumina (clay), with a little organic matter; only a few angular grains of quartz and one or two very strongly refractive and doubly refractive grains, probably of iron, were observed in this insoluble residue. The dust was thus of the nature of an argillaceous and calcareous sand, and may have been carried by wind from the north of Africa. In his report, Mr. Prior remarks: "An account by C. V. John, with analysis, of fine brown dust which fell in Hungary in February, 1896, appeared in scientific publications at the time. This dust, like the above, was characterized by the almost total absence of quartz, and by the presence of grains of transparent amorphous clay material. It differed from the above, however, in not containing any large amount of carbonates. The similarity in chemical composition of this Hungarian dust with that of Nile mud is pointed out, and the suggestion is made that the dust may have been derived from Egypt."—Nature.

### A New Development in Locomotive Boilers.

A large locomotive has recently been turned out at the West Albany shops for the New York Central Railroad, which embodies a novel and promising feature of boiler construction. It was built from the designs of Mr. Cornelius Vanderbilt, Jr., who has lately been giving considerable attention to the question of locomotive improvements. It is well understood that the standard type of firebox as now constructed is one of the most costly features in the boiler. On account of its rectangular shape and flat sides it has to be heavily stayed to the outer shell of the boiler and is one of the parts that call for most careful attention and most frequent repairs. In the new locomotive a tubular, corrugated furnace, 64 inches in diameter and 11 feet 2¼ inches in length, is placed eccentrically within the back of the boiler shell, which, in the neighborhood of the furnace, is 7 feet 1⅝ inches in diameter. The corrugated furnace is supported at its front ends by sling stays which are attached at the tube sheet. At the rear the large furnace tube extends about 6 inches beyond the back face of the boiler, to which it is flanged. A brick wall, 20 inches in height, extends above the grates at a point about 30 inches to the rear of the tube sheet, the space between the brick wall and the tube sheet forming a combustion chamber.

The furnace presents a heating surface of 191½ square feet, and in the 332 tubes there are 2,164½ square feet, the total heating surface therefore being no less than 2,356 square feet. There are 35·2 square feet of grate area. The total weight of the engine is 160,000 pounds, and a boiler pressure of 185 pounds to the square inch is carried.

As far as we know, the use of the corrugated tubular furnace in a locomotive of the standard type is entirely new in America; the only other instance of the use of the corrugated furnace being the Strong locomotive, which, among other peculiarities, carried a bifurcated boiler with two separate corrugated fire boxes. If the manifest advantages of this system of construction can be utilized in a locomotive of the standard type, Mr. Vanderbilt has set a very valuable precedent, which will probably be extensively followed in American locomotives.

The boiler has shown excellent steaming qualities and as compared with the standard engines of the road it marks, in this respect, a decided advance. Evidence of this was shown during a trial trip with sixty-seven empty cars, when the pressure ran up to 195 pounds in spite of the fact that the two pop valves set at 180 pounds were blowing off strongly. We shall give illustrations and fuller details of this engine in an early issue.

### Car Couplings in England.

The committee appointed to examine designs for improved couplings for railway vehicles in Great Britain state that they are prepared to receive any photographs or written or printed description of automatic or non-automatic couplings for railway vehicles, but not with a view of making any selection from the various inventions which may be submitted. The committee are not at present prepared to receive models of any couplings, but if models or personal attendance is required, the persons interested will be notified. All such drawings and photographs or descriptions must be sent to the Secretary, 6 Old Palace Yard, London, S. W., England, on or before October, 1, 1899.

The committee does not give any assurance that communications made to them on the subject of the inventions will be protected, so that we recommend those of our readers who expect to submit their ideas to this committee to protect their inventions. The report of the committee will undoubtedly be of far reaching importance, and the question of automatic couplings is now agitating the British newspaper press as well as the technical press.

RAILWAY traveling in Algeria certainly leaves very much to be desired. From Algiers to Biskra is 400 miles, and it requires thirty-six hours to perform the journey. The trip from Oran to Algiers is 263 miles, and this requires twelve hours. Sleeping cars are required on all night trains and restaurant cars on all through trains.

WE regret to note that M. Gaston Tissandier, the French physicist and aeronaut, died on September 8 at Paris. He was for many years editor of La Nature.