SCIENCE

[Entered at the Post-Office of New York, N.Y., as Second-Class Matter.]

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

EIGHTH YEAR.
VOL. XV. No. 363.

NEW YORK, JANUARY 17, 1890.

SINGLE COPIES, TEN CENTS.
$3.50 PER YEAR, IN ADVANCE.

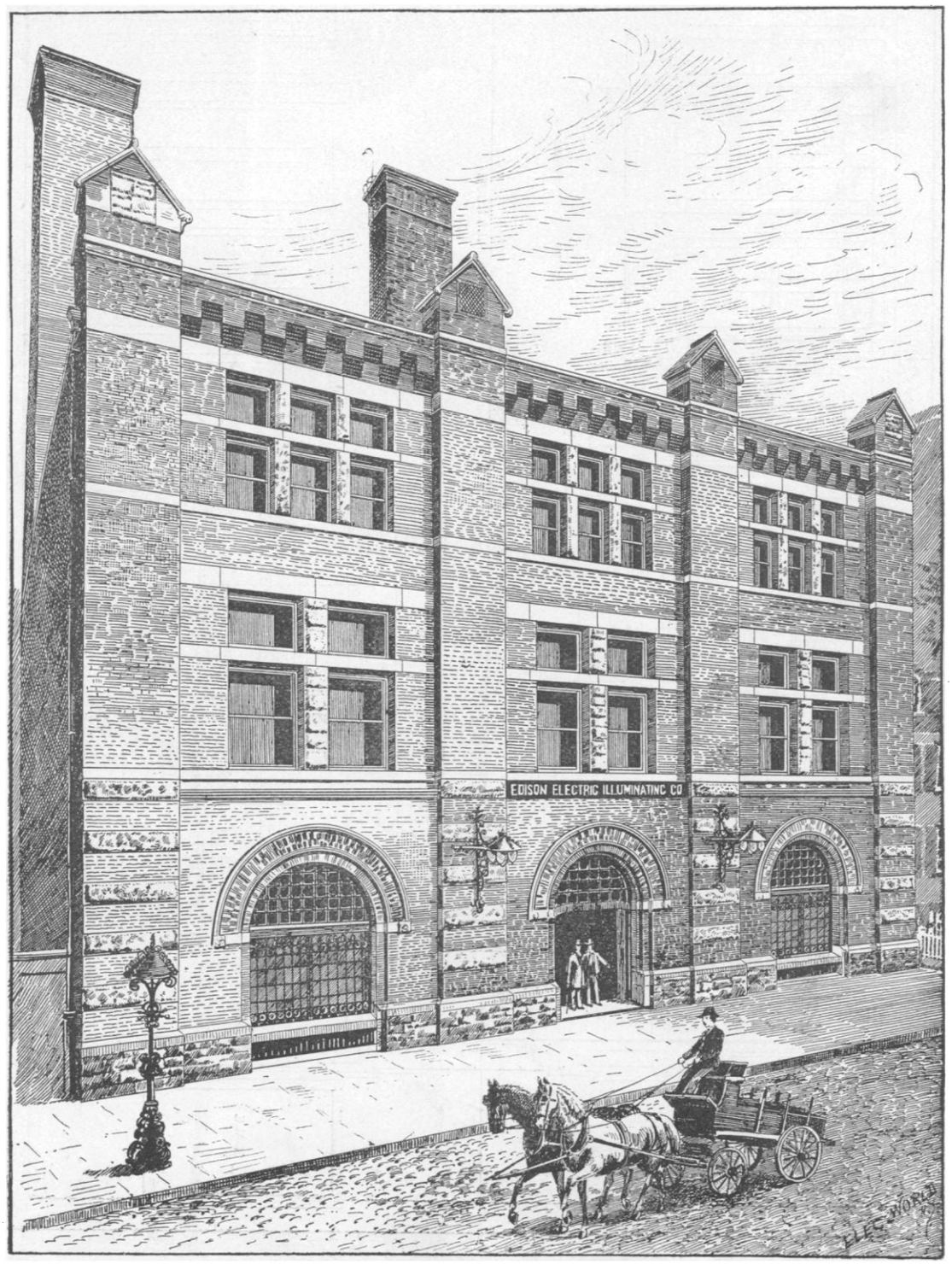

FIG. 1.—EDISON CENTRAL STATION, BROOKLYN, N.Y. (See page 36).

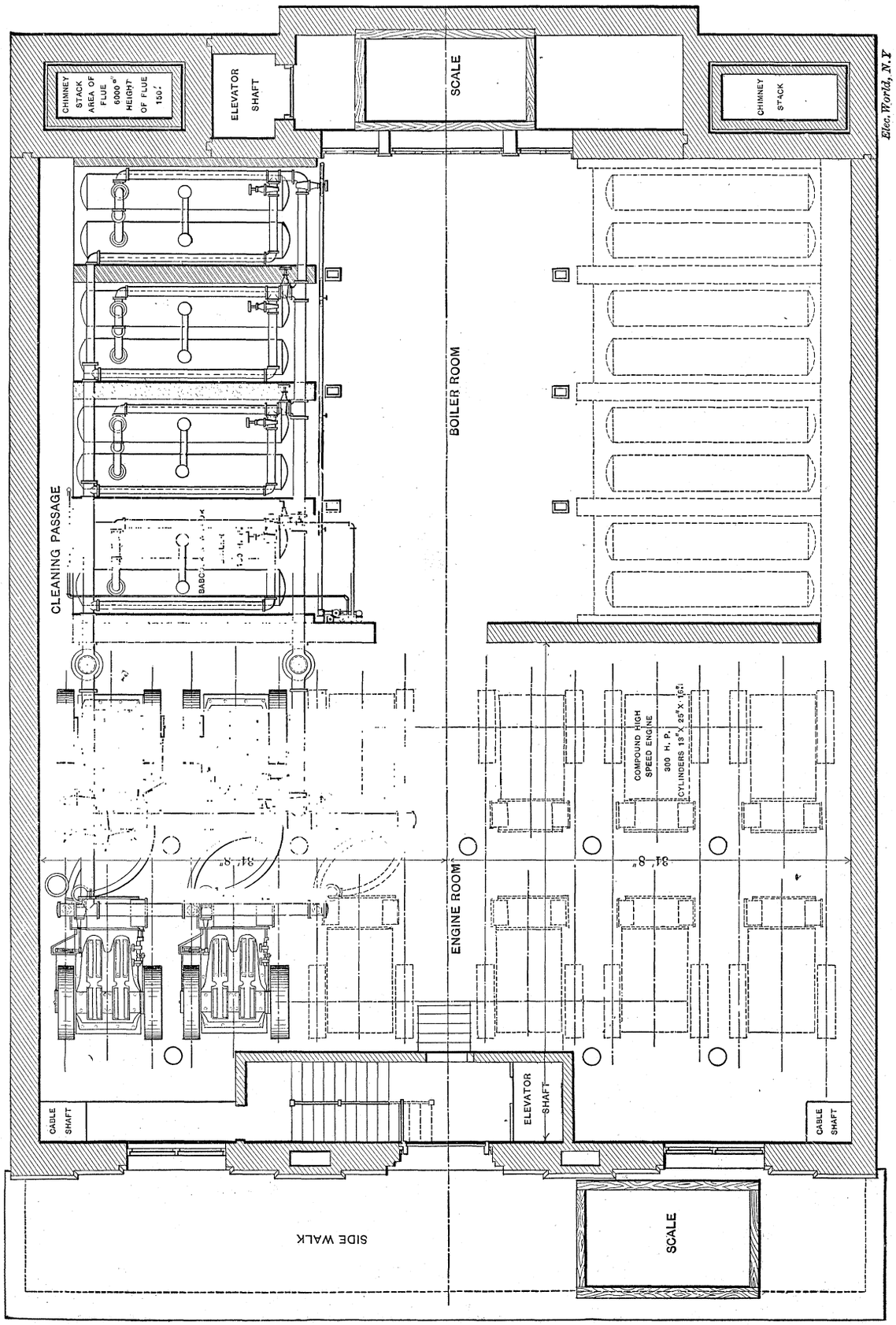

FIG. 2. — PLAN OF ENGINE AND BOILER ROOM, EDISON BROOKLYN STATION (See page 36).

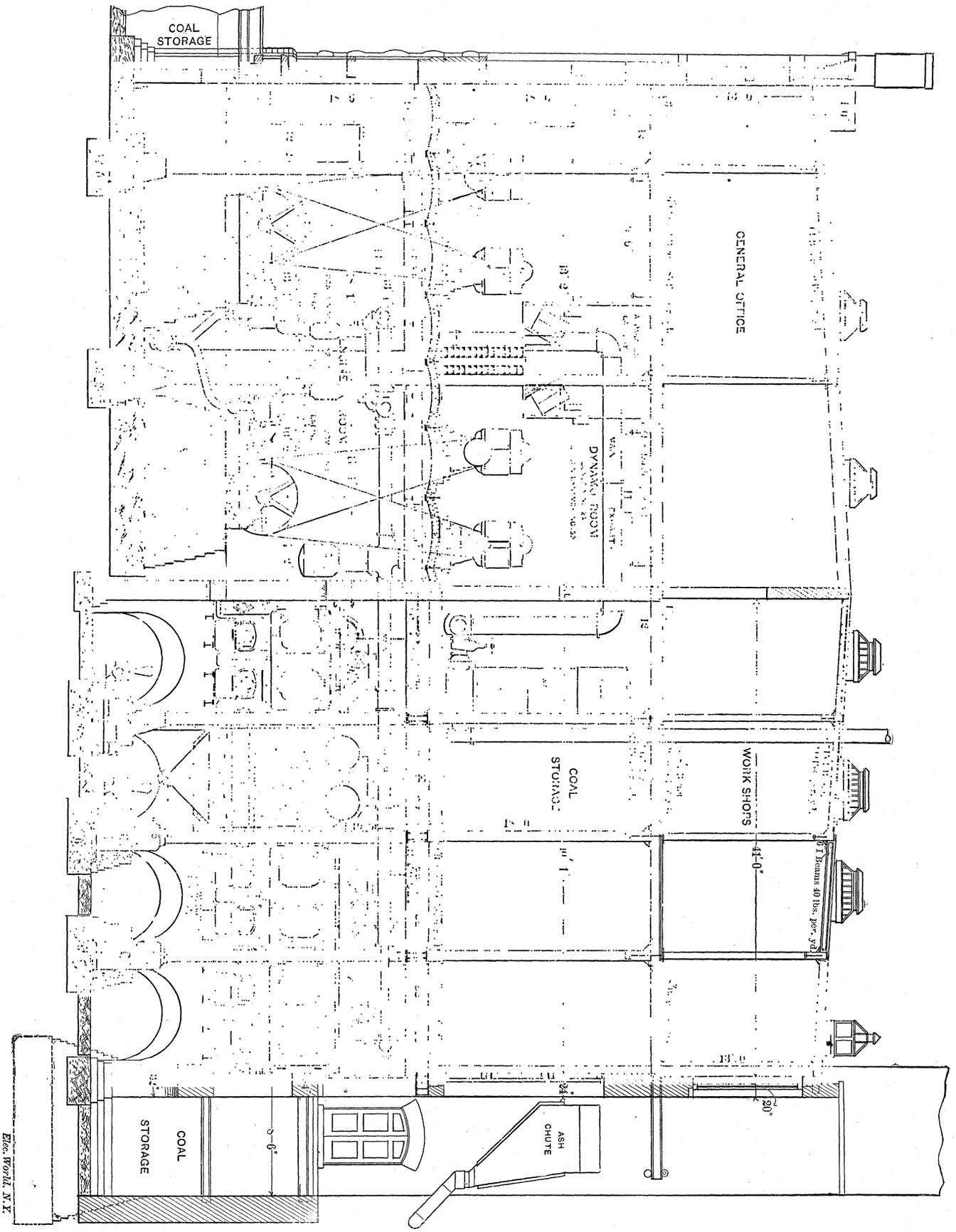

FIG. 3.—VERTICAL SECTION, EDISON BROOKLYN STATION (See page 36).

Elec. World, N.Y.

THE EDISON ELECTRIC LIGHT STATION IN BROOKLYN.

WE illustrate in this issue the central station of the Edison Illuminating Company recently completed in Brooklyn, N.Y. Fig. 1 is a view of the Pearl Street front of the building, Fig. 2 is a plan of the engine and boiler room, and Fig. 3 is a vertical section of the station. The station is designed for an ultimate capacity of 36,000 lights of 16 candle-power each. At present only about one-third of the plant is installed, that being sufficient to supply the immediate demands. The rest will be added as required.

The building, which is fire-proof throughout, is seventy-four by a hundred feet, three stories high, and is located practically in the centre of the district to be supplied. Besides the generating plant, supply rooms, store rooms, etc., the building has ample room for offices, thus enabling the company to centre all departments of its business under one roof.

Under the sidewalk are located large reserve coal vaults, the coal for immediate use being in a storage room on the second floor, over the boiler room. On the first floor are the engine and boiler rooms; the dynamos and electrical apparatus generally are on the second floor, and the third is taken up by store and supply rooms and by a suit of handsomely fitted offices. Under the engine room is a solid bed of concrete four feet thick, laid entirely apart from and independent of the wall foundations. Upon this rest the foundations for the twelve engines. In this manner all jar from the engines is absorbed or neutralized, none of it being transmitted to walls or floors.

The engines are high-speed compound Ball engines, of three hundred horse-power each, the high-pressure and low-pressure cylinders being respectively thirteen and twenty-five inches in diameter and sixteen-inch stroke of piston. These are said to be the heaviest and largest engines of their class ever built. The general arrangement of engines and boilers is shown in the plan, Fig. 2.

Steam is supplied by eight Babcock & Wilcox sectional boilers of the largest type, arranged in two groups or batteries of four each. Each boiler has about 2,800 square feet of heating surface — between six and seven square feet for each horse-power developed. The boiler room has all necessary arrangements for the convenient working of the plant. The ash-pits under the boilers, into which the ashes are raked from the furnaces, discharge into a car running on a track in the basement, which is then hoisted on an elevator, thus avoiding all shoveling and handling. The coal is elevated to the store-room, whence it is fed down to the boilers through chutes, on each of which is a special coal-scale, so that every day's supply is known, and the economy of the plant is constantly recorded. Water meters, in a similar way, record the quantity of water used. Two main steam pipes extend from the boilers to the engines, each engine and boiler being connected to both pipes, so that any boiler or engine may be disconnected without interfering with the operation of the others.

The front half of the second story is devoted to the electrical plant. The space is arranged for twenty-four Edison dynamos, each engine being belted directly to two dynamos. The dynamos run at a speed of 650 revolutions per minute, and each has a normal capacity of fifteen hundred sixteen-candle power lights. In both engine room and dynamo room overhead travelling cranes are arranged, for the convenient handling of heavy pieces of machinery.

Through the centre of the dynamo room runs what is called the "electrical gallery," to which are brought all the cables from the dynamos. In the centre of this gallery, within easy reaching distance of one person, are arranged all dynamo swtches, dynamo field-boxes, ampére meters, etc., so that one man in this gallery has all the electrical apparatus under his immediate control.

From this gallery seventeen feeders run to different parts of the district to be supplied with lights. The three-wire system being used, each feeder consists of three cables, a positive, a negative, and a neutral. By the arrangement of apparatus in the gallery, the man in charge can see at a glance the total load on the dynamos, and through what feeders and in what part of the district this load is being distributed. The underground system or net-work of wires throughout the district is all united by large mains; and the regulation of current is such that at no time is there a difference of potential of more than one volt throughout the district.

The underground system, as at present laid out, is arranged for a total of twenty thousand lights, and may be readily extended as the demand warrants. It covers an extreme distance of a mile from the station in one direction, and about three-quarters of a mile in the other, in an excellent business and residential district, from an electric lighting point of view.

The Edison system of underground tubing, which has proved so successful, has been introduced here, with many improvements and additions. The maximum drop under full load is one per cent on the mains, and there are only four sizes of tubes used in the mains, ranging respectively from 100,000 to 250,000 circular mils. Mains, as here introduced, are in larger-sized tubes than have heretofore been used, allowing more insulation compound to be introduced into the tube. All three wires in the mains are of the same size.

The Edison system of distribution is too well-known to need any extended description. Service connections can be taken off at the coupling boxes every twenty feet. At all street crossings are placed main junction boxes with busses, into which all mains at each street-crossing are brought, thereby uniting and tying the mains together at every corner, to obtain uniform distribution and pressure, and to allow more readily of a proper inspection of the system. At these boxes each main is protected by an ampère safety catch of proper size, except the neutrals, which are coupled with solid copper catches. Into certain of these junction boxes the feeders running direct from the station are connected to the system of mains. In case any feeder is disconnected, for any cause, it will not in any way affect the system, as the main which it is directly feeding will be supplied from the other feeders. In case of any accident or short circuit on the main, it does not throw off the service from any customer, as the mains are fed out to the point of trouble from both directions. Five of the feeders, instead of running to only one point of distribution, run to a certain point, and from there to two or three other points. This is to obtain better control and distribution over the system. This underground system, after completion and being thoroughly tested and started in operation, showed an insulation resistance on the whole system of over 700,000 ohms, said to be the best result in that direction ever achieved in an underground system.

THE BASIN OF THE KONGO.

A GREAT deal of interesting information concerning the Kongo, gathered from trustworthy sources, is given in the December number of the *Scottish Geographical Magazine*. The estuary of the river, between Banana Point and Shark Point is eight miles across, and soundings have indicated depths of sixty fathoms. The current at the mouth is very rapid, certainly not less than three knots an hour, or a little over five feet per second. Taking the vertical section at the mouth to be a triangle, the base of which measures eight miles and the altitude sixty fathoms, it will be found that about 1,060,000 tons of water are poured into the sea per second. The effect of this huge volume is perceptible as far as six degrees of latitude northwards from the mouth of the river, or to a distance of 360 nautical miles, so that a vessel making for Banana feels this formidable resistance after crossing the Equator, and its speed is diminished. Sailing-vessels have often to wait for weeks for a spring-tide, or a strong wind springs up, and enables them to enter the river.

Another phenomenon is the current caused by the water at the edge of the stream losing its onward velocity, and being forced back towards the land, where it spreads itself out along the coast. The ports along this coast, such as Kabinda, Loango, etc., are only roadsteads with but little shelter. Vessels have to be loaded and unloaded by lighters towed by small tugs. The lighters are sometimes overturned, when their cargo, if it be palm-oil, for instance, floats, and the owners know where it will be found on the shore. For example, any article that falls into the sea off Landana,