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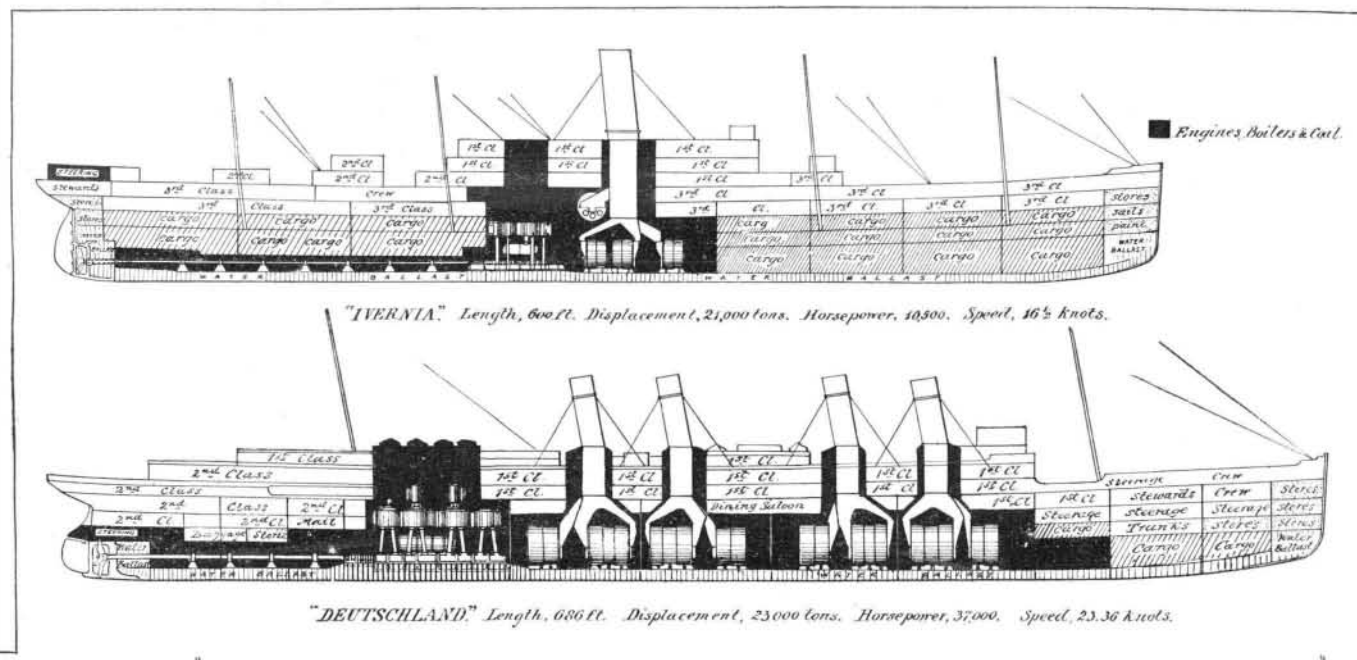
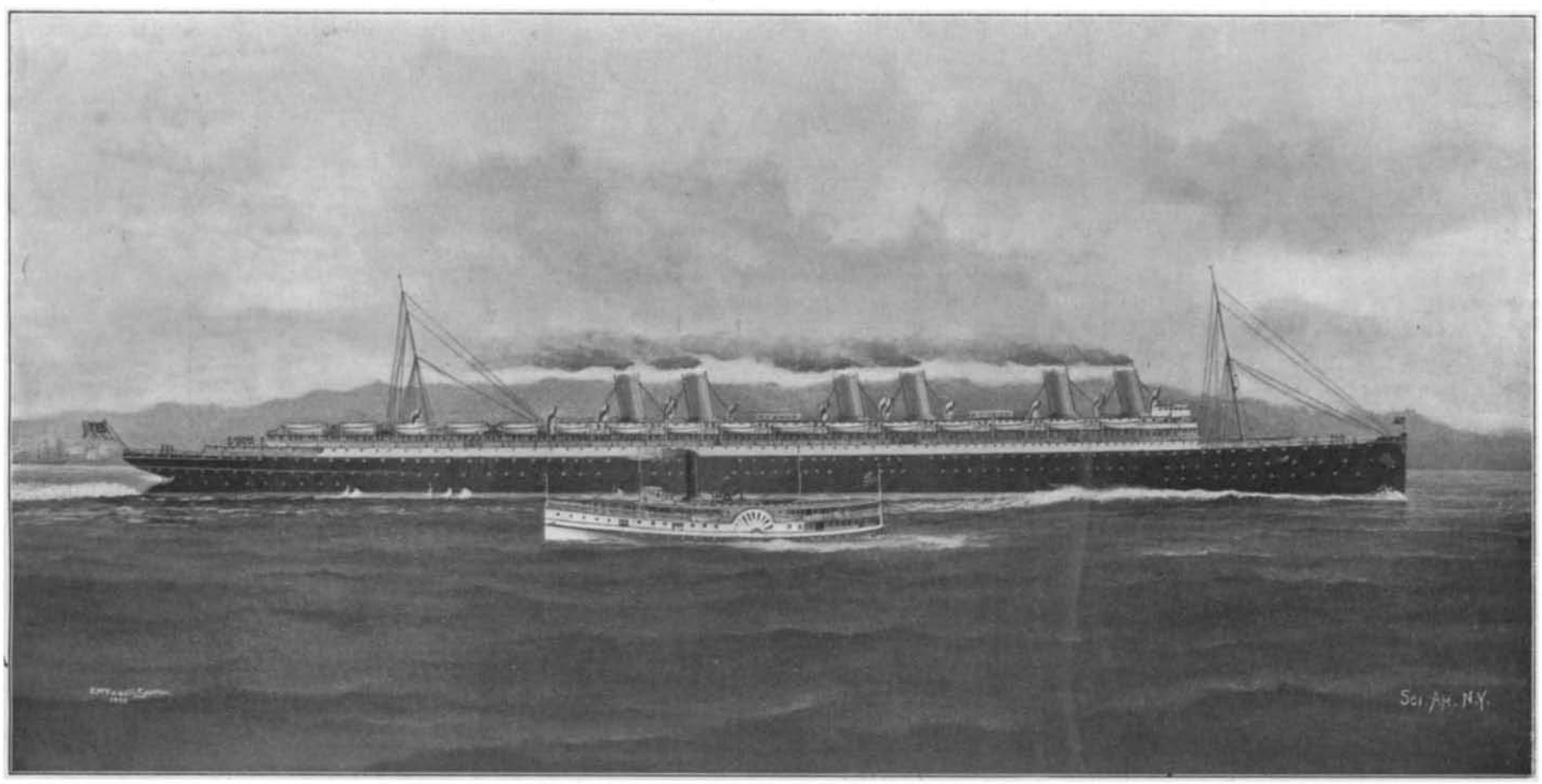
ATLANTIC STEAMSHIPS—PRESENT AND FUTURE.

The development of the transatlantic steamship has reached a point at which it shows a decided tendency to follow along two widely divergent lines. On the one hand we have the fast, high-powered express steamer, carrying only mails and passengers, in which the customary cargo space is monopolized by engines and boilers; while sharply distinguished from this is the vessel of large cargo and passenger capacity, but of moderate speed. Of the latter type the "Ivernia," of the Cunard Company, is the latest and largest representative, while the Hamburg-American liner "Deutschland" is the latest and fastest and most extreme of the high-speed passenger ships.

It is claimed by (Continued on page 294.)



Cost of Increasing the Speed of Ocean Liners—Diagram Showing Excessive Demands for Engine and Boiler Space.



A Four-Day Transatlantic Liner?

ATLANTIC STEAMSHIPS—PRESENT AND FUTURE.

background and the main wall at the back is a light soft red, while the arches of the doorways are treated in red, blue, yellow, and other tints to give a mosaic work effect. The cornice of the hood over the entrance will be of brownish wood color. Passing through the entrance and coming to the vestibule, the color will assume an exceedingly rich tone, and the same will be true of the pavilions, which will have elaborate and even gorgeous hues, the colors heightening the effect of the richly ornamented architecture.

Realizing that color is a delicate thing to experiment with, many had expressed the fear that the new departure which has been made in coloring the buildings of the Pan-American would not be a success. From a careful study of what has now been accomplished, it is safe to predict that in this as well as other respects the Exposition which is springing into reality here on the Niagara frontier is going to give the appreciative and discriminating public a most agreeable surprise.

ATLANTIC STEAMSHIPS—PRESENT AND FUTURE.

(Continued from first page.)

the companies which have given up the construction of abnormally fast vessels that they do not, and in the nature of things can not, pay; yet we find on the other hand that the North German Lloyd Company, who have had sufficient experience with the "Kaiser Wilhelm" to judge intelligently of the question, are planning and building vessels that are to surpass in speed and size anything afloat. To assist our readers in drawing their own conclusions, we present drawings and comparative data of the two types of vessels above mentioned.

While the representatives of the companies are naturally reluctant to give exact figures, the data contained in the accompanying table may be relied upon as sufficiently accurate for all purposes. To show how nearly we have in the "Deutschland" reached the limit of economical speed, we have calculated the proportions and leading particulars of a four-day express steamer of 30 knots; and it will be at once evident to our readers that unless some radical change is made in the present methods of producing and utilizing steam as a source of motive power, the 30-knot liner is not likely to get beyond the paper stage.

"IVERNIA."—The "Ivernia" is the latest representative of a type of huge vessels, half cargo, half passenger, which of late years has become very popular, both with the steamship companies and the traveling public. The first of these to visit the port of New York was the "Pennsylvania." She was followed by such vessels as the "Cymric," "Pretoria," and "Grosser Kurfürst," the latest representatives being the "Ivernia" and "Saxonia" of the Cunard Company. As these vessels are of moderate speed, it is possible to give them very full lines, and they are all of great moulded depth, the "Ivernia" measuring 49 feet 6 inches from the keel to the shelter deck.

The speed being only from 14 to 16 knots, comparatively little space and weight has to be sacrificed to motive power; and as the daily coal consumption is only from 100 to 150 tons, a bunker capacity of from 1,000 to 1,250 tons is found to meet all requirements. These vessels are enormous cargo carriers, the "Ivernia" having four cargo holds forward and three aft of the engine room, while above these are two decks, also entirely devoted to cargo. When fully loaded she can accommodate 11,610 tons of actual dead weight, while her measurement capacity at forty cubic feet to the ton is 24,000 tons.

The type is so deep and stable that it is possible, by carrying up the structure of the vessel amidships to an unusual height above the water line, to provide unusual passenger accommodations, the "Invernia" being provided with seven decks in all. Above the hold and the orlop and lower decks, which are given up to cargo, there are three other decks, known as the main, the upper and the shelter decks, which extend entirely from stem to stern. The main and the upper decks are given up to third-class passengers, while the shelter deck is devoted mainly to first and second-class passengers. For a distance of over 300 feet amidships there are two other decks, called the bridge and promenade decks, on which first and second-class passengers are accommodated. There is provision altogether for 160 first-class passengers, 200 second-class and 1,600 third-class, so that in addition to carrying a paying load of 11,610 tons of cargo, this vessel provides for about 2,000 passengers. She burns but little coal, requires but a small engine and boiler-room staff, and hence the running expenses in comparison to her size and earning capacity are very low.

By the courtesy of the managers of the various steamship companies, we have been enabled to compare the average receipts and expenses for several of these big freighters, and we find a remarkably unanimous opinion that the greatest receipts for a single passage of a ship of the type of the "Ivernia" are about $50,000; the revenue from the westward voyages being derived mainly from passengers, and that from the eastward voyages from freight. We have estimated the average cost of one passage at $20,000; figures which go a long way to explain the popularity of these vessels with the shipowners.

	Displacement in tons.	Horse power.	Speed.	First cost.	Coal burnt per day, tons.	Bunker capacity, tons.	Cargo capacity, tons.	Passengers. First.	Passengers. Second.	Passengers. Third.	Crew.	Estimated maximum receipts for full ship, one passage, exclusive of mails.	Cost of one passage.
"Ivernia"	21,000	10,500	16·50	$1,625,000	150	1,250	11,610	160	200	1,600	250	$50,000	$20,000
"Deutschland"	23,000	37,000	23·36	3,300,000	572	4,500	600	450	300	300	550	*143,000	50,000
Four-day liner	40,000	110,000	30·00	6,200,000	1,710	9,550	None.	800	450	250	750	225,000	80,000

*Actual value of passenger fares on a recent westward trip.

"DEUTSCHLAND."—In the "Deutschland" we see the latest development of the high-speed liner. From whatever point of view she is regarded, she has been such an unqualified success that she lends herself admirably to the present comparison. She is not only the fastest and the most powerful, but, by virtue of her coal consumption of 1·45 pounds per horse power per hour, including auxiliaries, she is considerably the most economically-driven big vessel afloat. Compared with the "Ivernia," she is 86 feet longer, has 2 feet 6 inches more beam, and 5 feet less moulded depth. Her working draught of 29 feet is probably about a foot less, and on this draught, in spite of her much larger dimensions, she displaces only 2,000 tons more than the former vessel, the comparatively small increase in displacement being due to her yacht-like lines. The diagram which we herewith present of the ship shows more strikingly than any mere description at what an enormous sacrifice we obtain a speed of over 23 knots an hour; for here we find that the cargo space, which in the "Ivernia" has a capacity of over 11,000 tons, is in the "Deutschland" entirely appropriated by the engines, boilers, coal bunkers, machine shops, and stores which go to make up a motive equipment of 37,000 horse power capacity. The comparison preaches an eloquent sermon on the text that in the same vessel "resistance increases as something more than the cube of the speed." The larger displacement of the "Deutschland" is partly compensated for by her finer form; yet in raising the speed from 16·5 to 23·36 knots, the horse power has to be increased from 10,500 to 37,000, while the coal consumption runs up from 150 to 572 tons per day. So completely does the motive power fill up the hold that the cargo capacity is reduced to 600 tons, this amount being the maximum that she can carry. As a matter of fact, the "Deutschland" usually carries no cargo, ten tons being, we believe, the most she has ever taken aboard. To keep the enormous aggregate of machinery in motion requires the services of 240 engineers, oilers, stokers, etc., and the whole ship requires a crew, including the engineer's staff, of 550 men. The carrying of cargo being out of the question, the four decks above the boiler room are given up entirely to passengers, of whom she can carry 450 first-class, 300 second, and 300 third-class.

The running expenses of such a vessel are necessarily enormous. To take one item alone, the coal, we find that the cost, for the six days from New York to Hamburg, assuming an average price of $4.50 per ton, is about $15,500. In addition to this, and even more costly, are the fixed charges against the vessel, the most serious of which are the depreciation and the interest on first cost, which cost in the case of the "Deutschland," amounted to $3,300,000. It is customary to reckon depreciation in the case of these fast boats at 10 per cent of the first cost, and this for the reason that as soon as they are exceeded in speed by other vessels, they quickly lose their popularity and therefore their earning power. Moreover, the hard driving to which they are subjected induces a more rapid deterioration than occurs in slower vessels. Probably the fairest way to reckon depreciation on such high-speed vessels is to assume it as 10 per cent until half of the cost has been covered, and then reduce the rate to five per cent. Depreciation and interest, coal, wages of the crew, cost of provisions, dockage, tonnage dues, insurance and other items will bring up the total cost of one passage of the "Deutschland" to $50,000.

Does such a vessel pay? Popularly, it is supposed that she does not; but the experience of the "Deutschland" during this her first season gives reason to suppose that she is certainly not a losing investment. The popularity of these very fast boats enables the companies to realize correspondingly higher prices for accommodation. As a matter of fact, we know that on a recent westward run of the "Deutschland" the total passenger fares taken in amounted to $143,000, and the fares on the return passage brought up the total for the round trip to over $200,000, this sum representing the receipts from passengers alone, without taking into consideration what was received for carrying the mails. Since the cost of running the boat for one round trip, including fixed charges, is $100,000, we see that a profit of about $100,000 was realized in the space of three weeks. It must be remembered, however, that these figures represent the best voyage, and the receipts will not be so high throughout the rest of the summer season. Judging from these figures, it is likely that while for six months of the season she shows a profit, for three months of the year the "Deutschland" will only about make her expenses, while for the other three months she will probably be in dry dock and refitting for the next season's traffic, during which period the fixed charges will be accumulating against her. Altogether, it is likely that if only a moderate proportion of the heavy subsidies earned be taken into account, placing the boat in this respect on the same basis as her English and American competitors, the "Deutschland" will show a creditable margin of profit in the year's service. Over and above this there is to be reckoned in the world-wide prestige which undoubtedly accrues to the line which owns the fastest vessel.

FOUR-DAY LINER.—As to the possibilities of the future, it is evident that with our present form of hull and type of motive power, we have nearly reached the limit of economical speed. To drive the "Deutschland" at 30 knots would require about 83,000 horse power, two and a quarter times as much as she now possesses. The accompanying diagram proves that if Scotch boilers and slow-revolving engines were provided in the design of a 30-knot "Deutschland," it would be impossible to put into her shell more than one-half of the necessary amount of power. Evidently to secure 30 knots a larger boat would be required, and a larger boat means increased power to drive the increased weight. The increase in power, however, would not be directly proportional to the increase in the displacement, the longer ship being ton for ton easier to drive, because of the refinement of her lines due to her greater length. Nevertheless, by the time we have designed a boat large enough to carry the power corresponding to a speed of 30 knots, we shall have upon paper the mammoth ship represented in our drawings. She will be 930 feet over all, 87 feet in beam, and 30 feet in draught, and will displace about 40,000 tons. Engines of 110,000 horse power would be required, and even if triple screws were used, it would be necessary to develop 37,000 horse power on each shaft—a task that would stagger the best of the world's engine builders of to-day. Forty-four double-ended Scotch boilers would be required to supply the steam, and during each day's run of twenty-four hours 1,710 tons of coal costing $7,700 would have to be fed into the 352 furnaces. It would require 7,300 tons of coal to carry the vessel to Plymouth and 8,550 tons to take her to Hamburg, the cost of the fuel alone being $38,000. The ship would have to stow 9,550 tons of coal in her bunkers for a single trip across the Atlantic.

To anyone who has watched the reverse bending strains to which a ship like the "Deutschland" is subjected when she is being driven across the Atlantic seas, it is evident that we have come to a point where it will be necessary to give increased longitudinal strength to any vessel that exceeds the present length of 700 feet. In a four-day liner this might be provided for by running a longitudinal stiffened bulkhead, extending from the keel to the promenade deck, through the vessel between the after engine-room and the forward boiler-room bulkheads. The vessel might be further strengthened by carrying up the side plating to the promenade deck, which is placed one deck higher than in the "Deutschland," and by doubling the plating at the bilges and at the promenade deck, as shown in the midship section of the ship.

In conclusion, it is safe to say that such a vessel as this will never be built. We shall cross the Atlantic in four days, but not with a vessel of this type. The higher speed will be attained, not by multiplying engine and boiler weights, but rather by multiplying pressures and speed, and utilizing every refinement in the way of economizers, superheaters and feed-water heaters, as is being done by Mr. Mosher in his 40-knot craft, the "Arrow," described in our last issue of the SUPPLEMENT. If a 30-knot transatlantic steamer makes its appearance within the next few years, it is safe to say that it will be driven by the combination of water-tube boilers, using hot, forced draft, with fast-running reciprocating engines, using superheated steam, or with turbines of the Parsons type. So great will be the reduction of weights and saving of space achieved by this change, that it will be quite within the possibilities to produce on a displacement not much greater than that of the "Deutschland" a 30-knot ocean steamer that shall have equal accommodations for passengers.

An Italian of Pinerolo has succeeded in reaching the top of Colle di Sestrieres, 6,670 feet above the sea.

Science Notes.

Dr. Edward R. Squibb, the veteran chemist, died October 26, in his eighty-second year. He was appointed a surgeon in the United States Navy shortly after his graduation from Jefferson Medical College, and subsequently became surgeon in charge of the Brooklyn Navy Yard. During the Civil War he resigned from government service and became a manufacturing chemist. He devoted a great deal of his time to scientific experiments.

Another curious bog slide, similar to that which happened a year or two ago, has recently occurred in Ireland, near Lisdoonvarne in northwest Clare. The bog in question was several acres in extent, and its movements are adduced to the heavy rainfalls with which the district has been visited. The direction that the bog moved was toward a lower-lying valley, and it dashed over the intervening country with terrific velocity, completely demolishing a dwelling house and destroying two persons who were in the place at the time. The semi-liquid mass also wrought considerable damage to property during its progress.

Signor Cantalamessa, the director of the Venice Academy, has recently made a valuable discovery in that city. One day he chanced to visit the home of a poor man and was impressed with two dirty, ill-looking oil paintings. Closer inspection of the subjects convinced him that they belonged to the Italian Renaissance period, and he offered the owner the sum of $20 for the two pictures. The latter of course was absolutely unaware of the intrinsic value of the property, and he immediately accepted the offer. The Director took the pictures away and cleaned them. One was found to be a "Holy Family" by Titian, and the other by Bassano. It was only a short time ago that a valuable Rubens was similarly unearthed in a strange place in London.

Dr. Letts, the Professor of Chemistry at the Belfast College (Ireland), in collaboration with his colleague, Mr. Hawthorne, has discovered that sea weed is a valuable test for ascertaining the presence of sewage in sea water. His attention was directed to this subject by the large quantities of sea weed outside Dublin and Belfast that were putrefying. The two chemists thereupon determined to discover the reason of this extensive putrefaction of the weed, and protracted investigations proved that the successful growth of the weed depends almost entirely upon the presence of sewage in the water. The greater the pollution, the more prolific was the growth of the weed, while, on the other hand, if no pollution of the water existed, the weed simply died. Prof. Letts communicated the results of his experiments in this matter to the chemical section of the British Association.

The coffee-growing industry in tropical Africa is developing tremendously. The seed was introduced into the country about five years ago by some English missionaries, who conveyed a few beans from Kew with the object of ascertaining whether the resources of the country were favorable to the culture of the article. Judging from results, the ground appears peculiarly adapted to the industry, since last year 100 tons of coffee were exported from Uganda alone, and the result of this year's production will be even greater. Blantyre coffee is generally contended to be the finest in the world, even excelling the famous Mocha. It is greatly in demand in England, but unfortunately up to the present the supply is very limited. The great difficulty with which the growers have to contend is the imperfect means of transporting the article from the plantations to the sea. This difficulty, however, will be overcome to a great extent by the construction of the Uganda Railway.

The chemical composition of the atmosphere differs but little, wherever the sample may be taken. The London Lancet considers that the favorable effect of a change of air is not due to the change in the proportion of gaseous constituents. One important difference, however, is the bacteriological one. The air of high altitudes contains no microbes, and is in fact sterile, while nearer the ground they are abundant. In the air of towns and crowded places, not only do the microbe impurities increase, but other impurities are found, such as the products of combustion of coal, etc. Several investigators have found traces of hydrogen and certain hydrocarbons in the air and especially in the air of pine, oak and birch forests. It is these bodies, which doubtless consist of traces of essential oil, to which the curative effects of certain health resorts are ascribed. Thus the vicinity of a fir forest is said to give relief in diseases of the respiratory tract; but these traces of essential oils and aromatic products must be counted, strictly speaking, as impurities, since they are not apparently necessary constituents of the air. Recent analyses have shown that these bodies tend to disappear in the air as a higher altitude is reached, until they disappear altogether. It would therefore appear that microbes, hydrocarbons and entities other than oxygen and nitrogen, and perhaps argon, are only incidental to the neighborhood of human industry, animal life, damp and vegetation.

Engineering Notes.

Acetylene gas headlights are being tried on the Atchison, Topeka and Santa Fe Railroad.

Work is progressing rapidly on the Theatre Français, Paris, and the masons have finished their work.

Acetylene safety lamps are used to a considerable extent in Germany. In a form which has been patented the closing cover of the calcium carbide container is arranged so that it is only possible to open the chamber containing the flame after the removal of the cover, and, therefore, extinguishing the flame.

The British naval authorities are going to raise new 100-ton shear legs within six hours at the dockyard at Portsmouth. The two upright legs are each 175 feet in height, while the hind legs extend to a height of 220 feet. The legs are connected at the top by a huge pin weighing 3 tons. The legs are to undergo a severe test when erected, and for this purpose they will carry a weight of 150 tons for the space of two hours over the large basin 60 feet from the wall of the dock.

While a new era has dawned for the sailing ship in this country, in England this craft is rapidly falling into desuetude. During the three months July, August, and September, out of 177 vessels which left the stocks in the English ship-building yards, only six were sailing vessels. At the present moment there are only 29 sailing vessels in course of erection in Great Britain, against 423 steamers. The sailing vessels most in demand are those of 100 and 200 tons, while there are only two vessels of 3,000 tons in hand.

The Gas Light and Coke Company, of London, are experimenting with a view to enriching their gas with petroleum, and for this purpose they have just received a huge consignment of oil from Borneo. One very salient feature in connection with this purchase is the fact that an economy of 25 per cent in cost was effected by having the oil from Borneo, instead of from America or Russia, notwithstanding the fact that the cargo had to be brought a distance of 9,000 miles. Another noteworthy fact is that the vessel which conveyed the oil to England was driven the entire distance by means of oil fuel. From these experiments it would appear that the difficulties which have generally been met with as regards the use of liquid fuel at sea have been obviated.

Herr A. Borsig, the well-known engineer of Berlin, is exhibiting at the Paris Exhibition a railway locomotive which he has constructed for the Prussian State Railways. The distinguishing characteristic of this engine is that it is provided with a superheater which contains more than one-fifth of the total heating capacity of the engine. This engine is the third of its class, and in it are embodied all the improvements which the experiments with the other two locomotives proved would be desirable. The experiments with the two previous engines demonstrated that this superheater is capable of raising the temperature of the steam, which has a pressure of 175 pounds to the square inch, to 626° Fah. The superheater is fixed in close proximity to the boiler, so that initial condensation is obviated and a great economy thus effected.

So successful has been the Blackwall tunnel in offering a means of communication between the north and south banks of the River Thames, that the arrangements are being rapidly advanced for the construction of a similar subway between Rotherhithe and Shadwell. This new tunnel will be one-quarter of a mile in length, and will extend from Rotherhithe on the southern bank to Shadwell Station on the northern bank. It will tap very thickly populated districts on both sides of the river, and will be even more useful than the Blackwall tunnel. The population that will be served by the scheme numbers 626,987 persons. The County Council proposes to expend $4,233,750 for the acquisition of the necessary land giving entrance to the subway from each side, etc.; while the total cost of establishing the communication will be $10,000,000, of which sum $7,000,000 will be expended upon the actual boring of the tunnel and approaches.

It will be remembered that some months ago an enthusiastic French engineer, M. Berlier, conceived the idea of constructing a submarine tunnel beneath the Straits of Gibraltar, thus bringing the coasts of Spain and Morocco into railway communication. The tunnel was to somewhat resemble that which was projected many years ago in England, by which Dover and Calais were to be connected. M. Berlier's project, like that of the English engineers, did not receive that enthusiastic recognition from the French government which he expected, and the matter was dropped. Now, however, he is reviving the scheme, and is determined that since he cannot secure State assistance to carry through the project he will achieve his ends by private enterprise. He contends that Morocco only wants developing by means of a thorough and efficient railway system to make it one of the richest countries in the world, but that it should be developed under French auspices. He has dispatched some of his own representatives to Fez, in the hope of enlisting the co operation of the Sultan of Morocco to insure the realization of the enterprise.

The Twelfth Census of the United States.

The population by the Twelfth Census of the United States was officially announced by Director Merriam to be 76,295,220, compared with 63,069,756 in 1890; this is a gain of 13,225,464 in ten years, or an increase of 21 per cent. The table given below is approximately correct, although it is subject to final verification. Seventy-four millions six hundred and twenty-seven thousand nine hundred and seven persons reside in forty-five States, the remainder in the Territories, Alaska, Hawaii, etc. No provision was made by the Census for the enumeration of the inhabitants of Porto Rico, but a census of that island taken on October 16, 1899, under the direction of the War Department showed a population of 953,243.

The population by States is as follows:

States.	1900.	1890.
Alabama	1,828.697	1,513,017
Arkansas	1,311,564	1,128,179
California	1,485.053	1,208,130
Colorado	539.700	412,198
Connecticut	908 355	746,258
Delaware	184,735	168,493
Florida	528,542	391.422
Georgia	2,216.239	1,867,353
Idaho	161,771	84,385
Illinois	4,821,550	3,826.351
Indiana	2,516,463	2,192,404
Iowa	2,251,829	1,911,896
Kansas	1,469,496	1,427,096
Kentucky	2,147,174	1,858.635
Louisiana	1.381.627	1,118,587
Maine	694.366	661,086
Maryland	1,189,946	1,042 390
Massachusetts	2,805.346	2,238.943
Michigan	2,419,782	2.093.889
Minnesota	1,751,395	1,301,826
Mississippi	1,551,372	1,289,600
Missouri	3,107,117	2,679,184
Montana	243,289	132,159
Nebraska	1,068,901	1,058,510
Nevada	42,334	45,761
New Hampshire	411,588	376.530
New Jersey	1,883,669	1.444.933
New York	7,268,009	5,997,853
North Carolina	1,891,992	1,617,947
North Dakota	319,040	182.719
Ohio	4,157.545	3,672.316
Oregon	413.532	313,767
Pennsylvania	6,301,365	5,258,014
Rhode Island	428,556	345,506
South Carolina	1,340 312	1,151,149
South Dakota	401,559	328.808
Tennessee	2,022,723	1,767,518
Texas	3,048,828	2,235,523
Utah	276,565	207,905
Vermont	343,641	332,422
Virginia	1,854.184	1,655,980
Washington	517,672	349,390
West Virginia	958,900	762,794
Wisconsin	2,068.963	1,686.380
Wyoming	92,531	60,705
Total (for 45 States)	74,627.907	62,116,811
Indians not taxed	44,617	
Territories.	1900.	1890.
Alaska (estimated)	44,000	32,052
Arizona	122,212	59,620
District of Columbia	278,713	230,392
Hawaii	154,001	89,990
Indian Territory	391,960	180,182
New Mexico	193.777	153,593
Oklahoma	398,245	61,834
Persons in the service of the U. S., stationed abroad (estimated)	84,400	
Indians, etc., on Indian reservations, except Indian Territory		145,282
Total for seven Territories, etc.	1,667,313	952,945
Indians not taxed	89,541	

The following list shows the population of a number of the principal cities of the United States:

Greater New York	3,437,202
Brooklyn Borough	1,167,582
Chicago	1,698,575
Philadelphia	1,293,697
St. Louis	575,238
Boston	560,892
Baltimore	508.957
Cleveland	381,768
Buffalo	352,219
San Francisco	342,782
Cincinnati	325,902
Pittsburg	321,616
New Orleans	287,104
Detroit	285,704
Milwaukee	285,315
District of Columbia	278,718
Newark	246,070
Jersey City	206,433
Louisville	204,731
Minneapolis	202,718

A Peculiar Accident.

A peculiar accident occurred in a Western town recently. The big iron safe in a shoe factory refused to open, and the bookkeeper and engineer conceived the idea that they could burn out the combination by use of carbon and electricity. It took several hours to accomplish their purpose, but they finally succeeded, but not until they had stood for several hours in the glare of the electric light taking turns at holding the wire and carbon. When the work was over both complained of a dizziness and pain in the head which increased as the hours passed, and in a short time both went suddenly blind at about the same time. All efforts to restore their sight have been unavailing, for while the eye balls appear all right, the sight is destroyed.