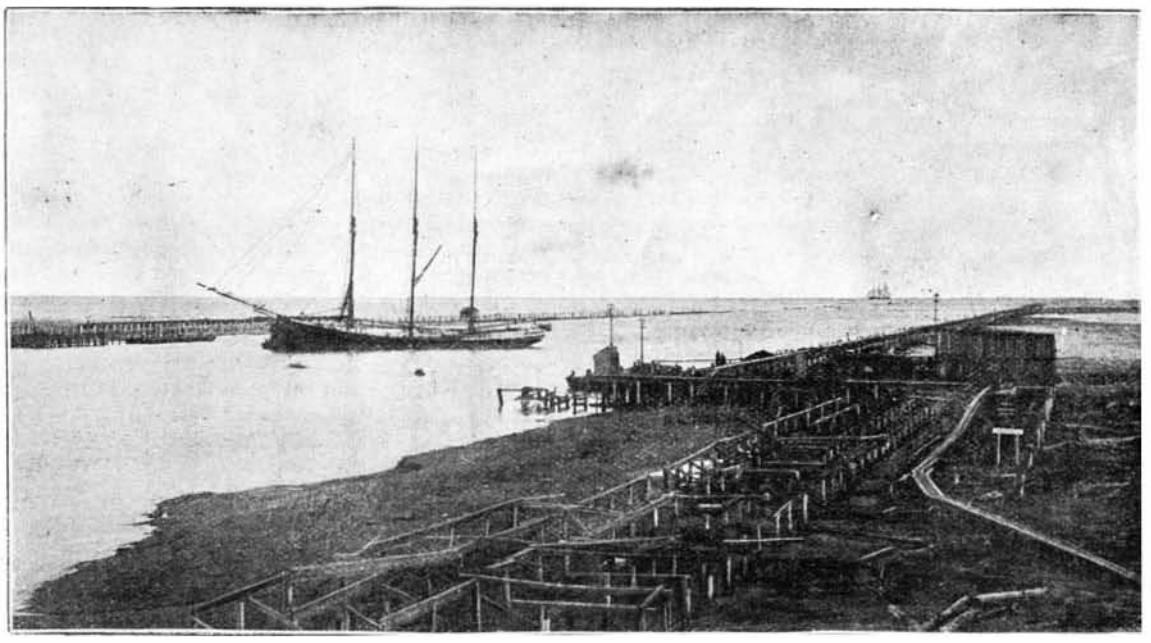
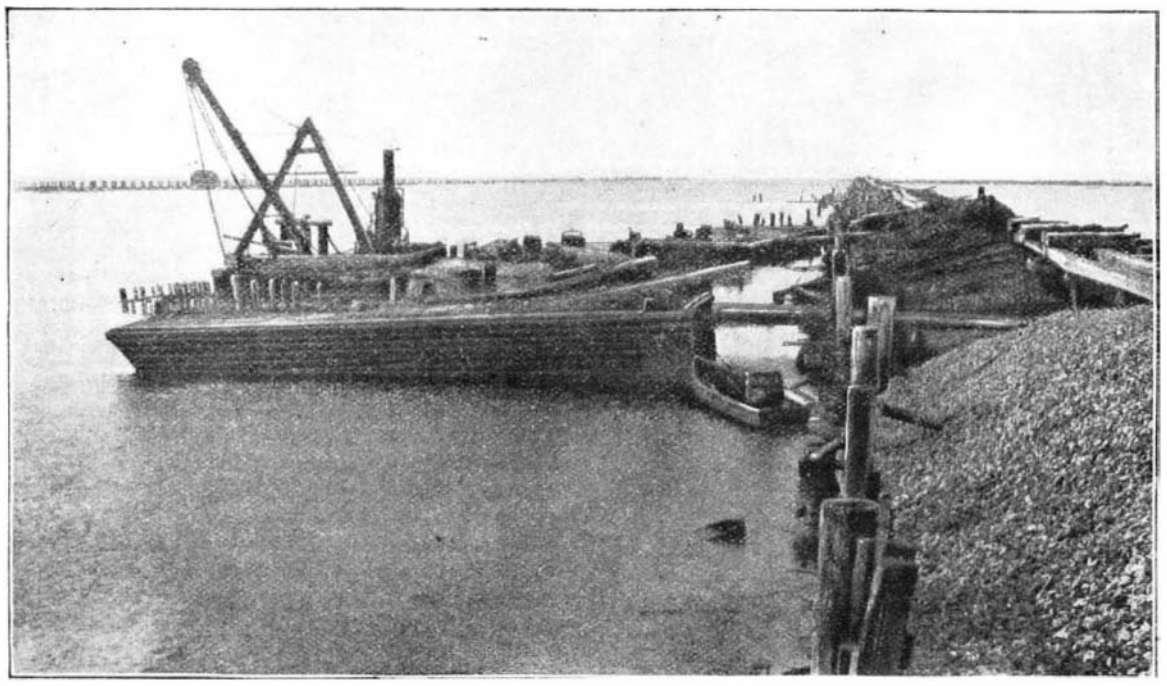
trucks, should such a thing be possible, as the remaining truck suffices to retain the car locked on the track until it stops, and then continues to hold it there. At each truck safety rollers are provided which would take its place in such an emergency in sustaining and guiding the car at that end and keeping it in position.—*Electrical Review.*

THE GREAT JETTIES AT THE MOUTH OF THE BRAZOS RIVER.

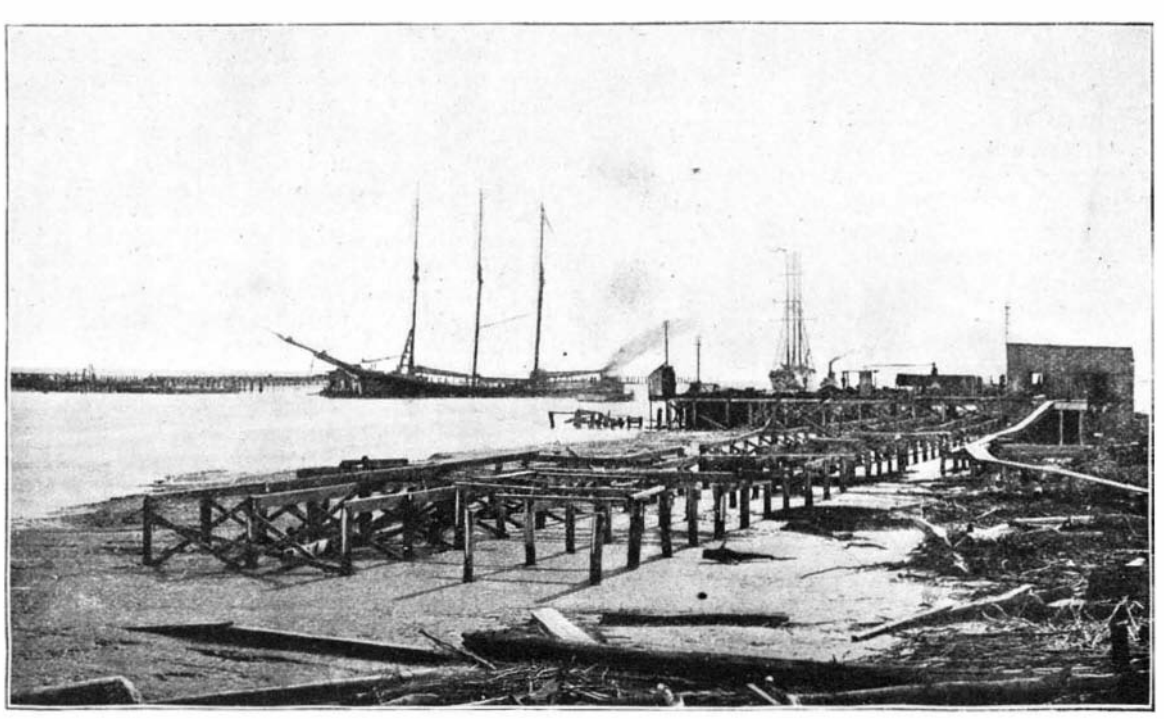
WALFRED W. WILSON.

There are being built at the mouth of the Brazos River, on the gulf coast of Texas, two massive jetties, the object of which is to scour out and maintain a depth of 20 feet of water over the bar. This work is being carried on by a private corporation, at a cost of $850,000, and is now almost finished. The jetties are 5,400 feet in length and 560 feet apart. They start from the shore line and extend out to and end upon the outer slope or over the bar. The mode of construction is as follows: Wharves are first built at the shore end of the jetties. Brush mattresses are then placed between the piles of these wharves and loaded with stone so as to form substantial headings from which to build the jetties seaward. The mattress work is constructed from a trestle of four rows of piling for each jetty. The mattress strips are made continuous by splicing, and the lower mattresses are supported by timbers suspended from the trestles. Brush is first piled crosswise, then lengthwise, and then crosswise again, sufficient that when compressed the mattress is from two to three feet thick and 250 feet in length. The strips are placed five feet apart and are connected by galvanized wire rope. A compression strain of one ton is given the binders at each connection. The upper strips of the lower mattress are used for the lower strips of the upper mattress, and





so on until sufficient thickness is obtained, that when firmly forced on the gulf bottom the top of the jetty will be about two feet above the flow of the average flood tide. The jetty is then loaded with stone and concrete to thoroughly consolidate it. The interstices of the brush work are filled with sufficient rock to give the jetty a weight of 75 pounds per cubic foot displacement. The jetties are parallel to each other, so that the forces at command are applied uniformly throughout the whole length of the channel. The axis of the jetties are at right angles to the deep water curves in the gulf, and the end of the east jetty extends beyond the end of the west jetty, thus protecting it and the channel entrance from heavy seas and drifting sands. The work is carried on by means of a double railroad track extending seaward as the jetties progress, and the brush mattresses are hauled upon tilting ways placed upon a platform car, while the piles are driven by an overhanging driver. The mattresses are launched between the piles and loaded with sufficient stone to hold them in place. A platform is arranged under the tilting ways, on which the necessary amount of stone is carried, and from which it is thrown on the mattress as soon as it is afloat and made fast to the piles. When the sea will permit foundation mattresses are floated ahead, anchored in position by anchors or temporary guide piles and loaded with stone from flat boats. The sea end of the jetties will be provided with solid pier heads built of heavy blocks of stone and concrete to withstand the terrific wave force which at times nothing but the heaviest construction, with suitable slopes, can stand. Mr. E. L. Corthell, of Chicago, Ill., is the chief engineer and Mr. George Y. Wisner, of Velasco, Texas, is the resident engineer. The Brazos River is 800 miles long and drains an area of 36,000 square miles. It debouches boldly into the Gulf of Mexico in one solid stream, there being no delta formation at its mouth. The current of this great river will rush through the channel made by the jetties, scour away the sand and mud, and thus carry out the design of the engineer by acquiring and maintaining a depth of 20 feet of water over the bar.



JETTY WORKS, BRAZOS RIVER, TEXAS.

The Eye and the Telescope.

The following careful statement by Prof. E. S. Holden on the power of the eye and the telescope, as they are contrasted in actual experience, is of special and permanent interest:

If the brightness of a star seen with the eye alone is one, with a two inch telescope it is one hundred times as bright; with a four inch telescope it is four hundred times as bright; eight inch telescope it is sixteen hundred times as bright; sixteen inch telescope it is 6,400 times as bright; thirty-two inch telescope it is 25,600 times as bright; thirty-six inch telescope it is 32,400 times as bright. That is, stars can be seen with the thirty-six inch telescope which are 30,000 times fainter than the faintest stars visible to the naked eye. While the magnifying power which can be successfully used on a five inch telescope is not above four hundred, the thirty-six inch telescope will permit a magnifying power of more than two thousand diameters on suitable objects, stars, for example. This power cannot be used on the moon and planets with real advantage for many reasons, but probably a power of one thousand or fifteen hundred will be the maximum. The moon will thus appear under the same conditions as if it were to be viewed by the naked eye at a distance of say two hundred miles. This is the same as saying that objects about three hundred feet square can be recognized. So that no village or great canal or even large edifices can be built on the moon without our knowledge. Highly organized life on the moon will make itself known in this indirect way, if it exists. If one were looking at the earth under the same conditions, the great works of hydraulic mining or the great operations on Dakota farms or California ranches would be obvious.—*Worthington's Magazine.*

Defects in Tin-lined Tubes.

Some brass condenser tubes in the United States cruiser Baltimore, after being in service for a yearor more, were found to have experienced a peculiar change. In many places the metal was changed to almost pure copper, of a spongy texture, the zinc having completely disappeared. An investigation showed the probable cause of the failure to have been an electrolytic action between the tin lining of the tubes and the brass, the sea water circulating through the condenser forming the electrolyte. Had the tin coating remained perfect, no corrosion would have resulted; but the mud and grit carried in suspension through the condenser cut away the tin coating in spots, and it was at these spots that the change of the metal occurred. It was concluded that if the tubes had not been tinned at all, they would have remained intact.

Decisions Relating to Patents.

PATENTABILITY—ANTICIPATION.

In letters patent No. 367,484, issued August 2, 1887, to Jeremiah M. Watson, claim 1 is for a machine for compressing shank stiffeners, having "two rotating die or compressing rollers, the meeting faces of which are formed to present a recess, having one straight and one curved face or side, to thereby curve transversely one face of the stiffener," etc. Claim 6 is for a method of finishing the edges of shank stiffeners, consisting "in cutting out a blank from a sheet of material, leaving the same with beveled edges and obtuse angled corners, and thereafter passing the same between rolls having dies with rounded edges or margins in order to round the obtuse angles and beveled portions as cut." The Circuit Court of Appeals decides that the patent was not anticipated by either the "calendering process machine," of the American Shoe Shank Company, or the Blake or Tripp machines. 1.

Letters patent No. 188,079, issued March 6, 1877, to Henry W. Smith, for an improvement in sheet metal roofing, comprises a means for making a water-tight joint, and for securing the sheets firmly to the roof boards by means of an anchor piece of sheet metal, rectangular in form and bent at right angles, so that when one part is nailed to the roof the other stands upright. The adjoining sheets of roofing have upright flanges of unequal height, the anchor piece being between them. The vertical portion of the anchor piece is split centrally, and one leg is folded down over the shorter flange. On the higher flange a hem is turned down so as to embrace the top of the other leg, and then these parts are folded down over the shorter flange and anchor piece, thus completing a joint of six or seven thicknesses of metal, All these elements are old, and the claim is for a combination. It is held by the Circuit Court that the patent is valid, and not anticipated by the Boesch or the Diehl patents (No. 2,850, issued March 12, 1842, and No. 99,656, issued February 8, 1870), both of which, while resembling it in the split anchor and flanges of unequal height, require the folding of several thicknesses of metal at once; or by the Trissler and Stewart patent (No. 15,988, issued October 28, 1856), which has a solid anchor with a scroll, which fits into a similar scroll in the upper flange, while the scroll of the lower flange is inserted thereunder, thus forming a tubular joint. 2.

The Circuit Court holds that letters patent No. 205,816, issued July 9, 1878, to Henry Tibbe, claiming "a smoking pipe made of corncob, in which the interstices are filled with a plastic, self-hardening cement," were not anticipated, although prior to the application the bowls of corncob pipes had been varnished with shellac, unmixed with other substances, and plaster of Paris had been used to fill small cavities or cracks occasionally found in the cob. 3.

UTILITY.

In the same case the court rules that letters patent No. 205,816, issued July 9, 1878, to Henry Tibbe, claiming "a smoking pipe made of corncob in which the interstices are filled with a plastic, self-hardening cement," must be interpreted as for corncob pipe in which the exterior interstices of the cob are filled with a self-hardening cement; and though the invention is not of a high order, yet, in view of the generally recognized merit of the article, the patent is valid. 4.

EXTENT OF CLAIM.

In letters patent No. 230,590, issued July 27, 1886, to George F. Pinkham, as assignee of Jacob P. Tirrell, the claim is for, "in an electric lighting gas burner, a magnet for turning the gas cock by one electric impulse, combined with a fixed electrode, a', and a movable electrode, c', normally in contact, and mechanism connecting the armature with the movable electrode, to break the contact between a' and c' the instant after the gas is turned on, and create a spark for ignition, substantially as described." In the drawings, a' designated a platinum point on the fixed arm, and c' a small bent arm normally in contact with the fixed electrode. The Circuit Court of Appeals decides that the word "electrode" generally, and especially as used in the patent, means the platinum or other metal points constituting the poles of the circuit. 5.

ASSIGNMENT.

Letters patent were granted for a new improvement in school desks. The patentees formed a copartnership for its manufacture and sale, which, becoming involved in debt, was dissolved. The plant and manufactory were transferred to one of the firm, who agreed to carry on the business and pay off the indebtedness, and relieve the other member from all liability for the firm's debts. A deed for the plant was executed by the retiring member and placed in escrow, to be delivered on the performance of the condition. There was no mention of the letters patent in the deed or agreement. The Circuit Court lays it down that the right to manufacture and sell the patented improvement continued so long as the condition was complied with, and the custodian of the deed had a right to deliver it upon full performance of the condition. 6.

The purchaser of a patent right cannot rescind the sale on the ground of false representations that the patent was valid, and did not interfere with any prior patent, where the contract of sale itself contains an express warranty to the same effect, and an engagement on the part of the grantor to defend at his own expense all suits for infringement. 7.

1. Watson *vs.* Stevens, 51 Federal Reporter, 757.
2. Canton Steel Roofing Co. *vs.* Kanneberg, 51 Federal Reporter, 599.
3. H. Tibbe & Son Mfg. Co. *vs.* Lamparter, 51 Federal Reporter, 763.
4. Same.
5. Hanzel *vs.* California Electrical Works, 51 Federal Reporter, 754.
6. Routh *vs.* Boyd, 51 Federal Reporter, 821.
7. Reeves *vs.* Corning, 51 Federal Reporter, 774.

Automatic Brakes.

Repeated experiments on the Western Railway of France, especially between Paris and Mantes, have shown that with the Westinghouse brake a train of average load running at 80 kilometers (53 miles) per hour is pulled up without disagreeable consequences in a distance of less than 150 meters (168 yards) even without the co-operation of the driver; that is to say, with the regulator open. These experiments were made in connection with a system devised by M. Laffas, engineer to the Compagnie l'Ouest, for preventing collisions and rendering derailments harmless; these two classes of accident being by far the most numerous, and also the most serious in their effects. The Laffas system is divided under the following three heads: (1) The trains protect themselves by closing behind them automatically all the open signals they encounter. (2) All the trains are pulled up automatically; that is to say, without the intervention of the driver, so soon as they pass a signal set at danger. And (3) Signals set at danger cannot be taken off until the danger ceases to exist. By way of solution to the above threefold problem, M. Laffas has designed three appliances. The first consists of a strong cast iron stop placed between the rails, pivoting in bearings attached to a sleeper, and placed in communication by cranks and rods with a hand lever for putting it on and taking it off, the gear being interlocked with that of the signal. When the signal is set to danger, the stop is made to rise between the rails, so as to be struck by a lever on the train for putting on the continuous brake, the last named action constituting the third part of the system. The second consists of a movable bar mounted on links, as in a parallel ruler, so as to rise above the rail when put in action, to be depressed by the wheel tire when passing over it. This bar is interlocked by rods and levers with both the signal and the stop, so that the former is set to danger and the latter raised for putting on the brakes, when the train passes those portions of the line where the bars are to be fixed; these bars being for the protection of places such as crossings, where two trains might otherwise come into collision.

PHOTOGRAPHIC NOTES.

Niepce, not Daguerre.—A proposal to erect a new monument to Daguerre in his native village of Brie-sur-Marne has moved M. Leon Vidal, the editor of *Le Moniteur*, to remark that, but for Niepce, there would have been no Daguerre—photographically speaking, of course. Niepce was really the inventor of photography. Daguerre contributed his brick to the edifice, no doubt; but it is often forgotten that, without Niepce, photography would not have been known, and that in that case Daguerre would not have been the inventor of the Daguerreotype. Niepce was the real father of photography. It is an error to suppose, also, that Daguerre discovered the development of the latent image, inasmuch as a latent image existed in the bitumen process, being developed by dissolution of the unaltered bitumen. Development of the image on silvered copper was a different species of reaction, upon which modern negative processes are based; and, without attempting to minimize the importance of this discovery of Daguerre, M. Vidal concludes by pointing out that he followed Niepce. M. Vidal does service in the cause of historical truth by once more insisting on the relative positions occupied by these two men in the field of photographic discovery. Undoubtedly a great deal of the credit which belongs to Niepce is often given to Daguerre.

Converting Blue Prints into Black Prints.—The *Revue de Chimie Industrielle* says that the prints should be first passed through water acidulated with nitric acid, and thence into—

Carbonate of soda	50 grammes.
Water	1 liter.

In this the picture is changed to an orange tone, when it is removed and placed in—

Gallic acid	50 grammes.
Water	1 liter.

Being subsequently washed in water acidulated with HCl.

Recovering Fogged Plates.—In order to render plates which have been accidentally fogged, or have by mistake received two exposures, or are known to have been over-exposed, in a fit condition to be used again, M. Rossignol recommends their immersion in a bath consisting of—

Bromine water	50 c. c.
Tincture of iodine	20 "
Distilled water	1 liter.

After immersion for two or three minutes the plate is washed and dried. M. Rossignol says that, if the plate has only been partially exposed, it should be exposed to lamplight in order to make the fog impression uniform.

An Intensifier for Gelatine Negatives.—In the *Deutsche Photographen Zeitung* M. Kirchoff gives the following formula for an intensifier. To a solution consisting of—

Bichloride of mercury	10 grammes.
Water	800 c. c.

Twenty-five grammes of iodide of potassium are added until the red precipitate is dissolved, one gramme of hypo being then introduced. For use, the solution is diluted with its own volume of water, and intensification is allowed to proceed until the shadows of the negative are of a yellowish-green. The intensification is not apparent until the negative is dry.

Printing on Silk and Other Fabrics.—*Apropos* of M. Villain's recently published method of photo-dyeing, Mons. A. D. Lavroff writes to the *Paris Photographe*, detailing his method of printing on silk, cotton, etc. He prepares the following mixture:

Tartaric acid	1 gramme.
Common sugar	10 grammes.
Boiling water	100 c. c.

This is boiled for a minute and 0·5 gramme of borax added, the mixture left for six hours, the clear liquid decanted, 4 grammes of common salt added, and the solution filtered. The fabric is coated with the solution, and when dry is sensitized, dried, printed, toned, etc., as usual.—*Br. Jour.*

Music as a Remedy.

The connection between music and medicine was discussed by Dr. J. G. Blackman at a recent meeting of the Portsmouth Literary and Scientific Society. The subject is one of interest, both from a social and professional standpoint. In this instance it was regarded by the lecturer mainly in its medical aspect, and was treated on similar lines to those with which readers of the *Lancet* are familiar. The physiological foundation of musical therapeutics was examined and described as consisting in the power exercised by harmony over the vaso-motor function. Most will acquiesce in this view, which is also corroborated by the experiments of Riegel on the blood pressure and heart action during the performance of music. It follows naturally that the ailments most likely to be benefited by this means are those in which nervous disorder plays a leading part. A number of cases illustrating this point were quoted at the meeting referred to, and we should probably include among these one in which reduction of temperature followed the administration of "a dose" of melody. The violin takes high rank as a vehicle of the soothing property, and the other instruments best adapted to the treatment of disease by musical sounds were in the lecturer's opinion the harp and the pianette (not the piano), with which a few well chosen voices might be advantageously combined.

Dr. Blackman does not consider it feasible as yet to apply the musical method as above described in private practice, though he looks forward to its employment in hospital work, a hall being established in London where the services of musicians trained for this particular branch of their art might be obtained.

While willing to admit the salutary effect of good music in many cases of nervous disease, we confess that an arrangement so elaborate does not seem to us to be called for by the exigences of illness or justified by the importance of its probable effect. In any case of serious mental or bodily disorder the mild suasion of sweet airs must hold an altogether secondary place in the plan of treatment, and such as could usually be well filled with far less elaborate preparation.—*Lancet.*

Prominent Atlantic Steamers.

The following table shows the dimensions and power of the principal vessels constructed for the transatlantic trade since the Great Eastern was built:

Name.	Date.	Length, feet.	Breadth, feet.	Horse power.
Great Eastern	1858	680	82	7,650
Britannic	1874	455	46	5,500
Arizona	1879	450	45	6,300
Servia	1881	515	52	10,300
Alaska	1881	500	50	10,500
City of Rome	1881	546	51	11,800
Aurania	1882	470	57	8,500
Oregon	1883	500	54	8,375
America	1884	432	51	7,354
Umbria	1884	501·5	57·2	14.321
Lahn	1887	465	49	9,500
City of Paris	1888	500	63	20,605
Augusta-Victoria	1889	480	56	14,110
Columbia	1889	480	56	13,680
Teutonic	1890	550	57·5	13,000
Normannia	1890	520	57·1-4	16,352
Spree	1890	485	52	13,000
Furst Bismarck	1891	502·5	57·5	16,412
Campania	1893	620	65·3	30,000