SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XXXVI. No. 25. [NEW SERIES.] NEW YORK, JUNE 23, 1877. [$3.20 per Annum. [POSTAGE PREPAID.]

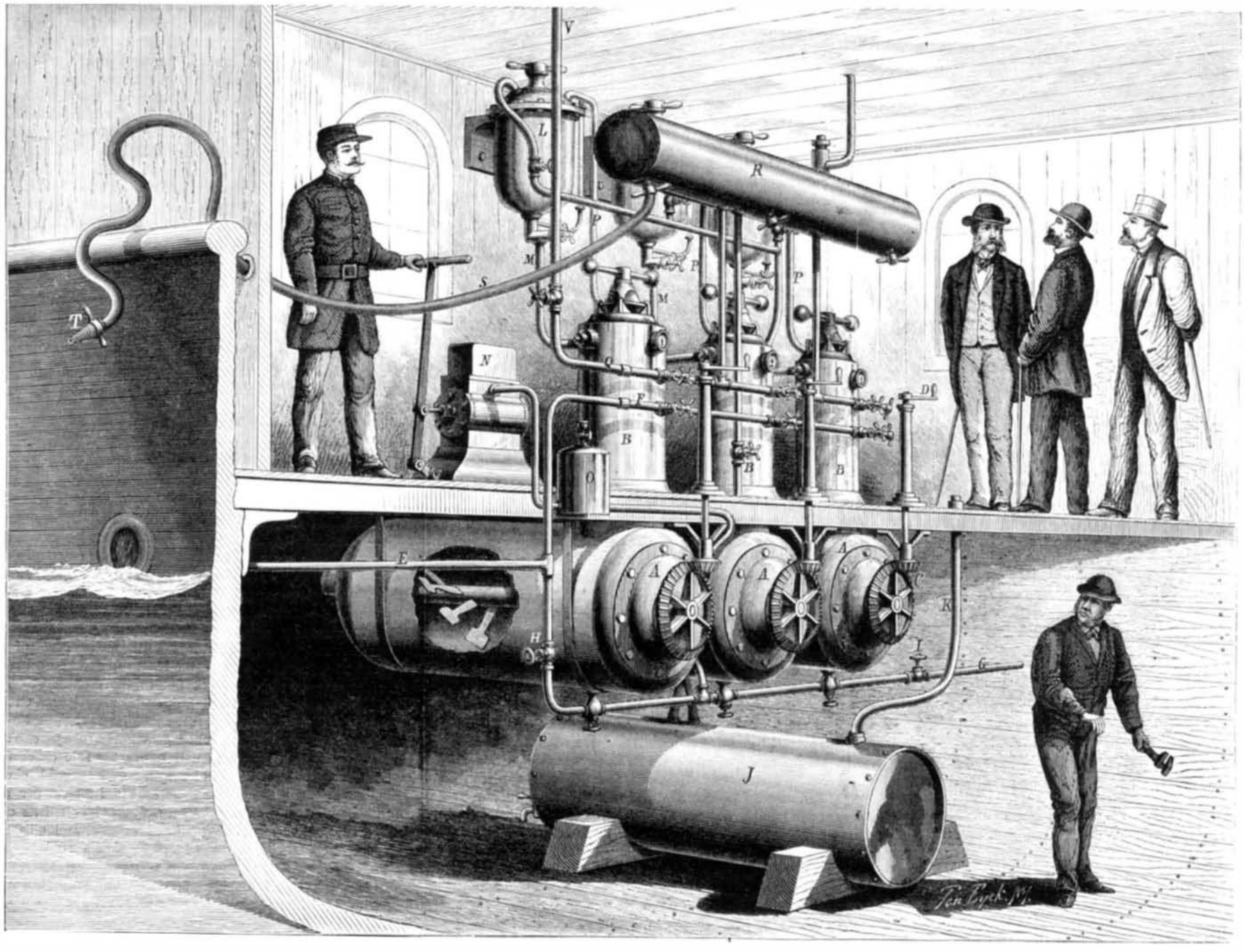
IMPROVED FIRE-EXTINGUISHING APPARATUS FOR VESSELS.

It is not two months since a fine steamer with a cargo of merchandise left Savannah for Nassau. The vessel had but fairly got to sea, when a cask of spirits, which had been improperly stored, broke adrift and leaked; and in some way the fluid caught fire. Although the ship had approved fire pumps, water was found useless against the intensely hot flame which almost instantly communicated itself to the timbers. Of the crew and passengers, who took to the boats, but few were saved. The vessel was entirely consumed. Here was a case where water as a means of extinguishing fire proved wholly inadequate; and we can recall no better illustration of one class of instances where such an invention as that which we are about to describe would have proved perhaps the only efficient means of protection. Again, a year or two ago, an oil ship in a French harbor caught fire. Every effort to put out the flames was futile; and the conflagration, extending to other craft, bid fair to burn all the shipping in the vicinity. A United States man-of-war in the port sent out her boats and towed the burning vessel into the roads, where she finally sank. This is an example of still another class of cases where a fire afloat, unless promptly overcome, is almost certain to result in large loss of property. We have repeatedly in these columns dwelt on the inefficiency of modern appliances in preventing disasters of this description. In a heavily laden vessel at sea, it is even dangerous to pour in water in sufficient quantities to extinguish fire, for the reason that the ship herself may thereby be sunk; and in a harbor there is always the peril of the flames extending to the light inflammable rigging of other ships, even if the difficulty of obtaining a full supply of water under pressure, at any given locality, does not exist. Suggestions have not been wanting for the use of carbonic acid gas as a fire extinguisher on shipboard, based on the successful utilization of the same in chemical engines and other patent devices ashore; but the problem has been how to establish apparatus, in the narrow confines of a ship's hold, which will be perfectly safe, and always ready to afford an instant and full supply of the gas. This is claimed to be solved by the invention here presented; and if we may judge from the successful issue of the trials to which the same has been subjected, the claim must be considered as well as substantiated.

The general principle on which the apparatus is based is the direct use of the dry gaseous carbonic acid in smothering volume, in contradistinction to the ordinary employment of limited quantities of the gas dissolved in water under pressure. The means for carrying out the invention are represented in our large illustration, Fig. 1. The generators, A, are copper cylinders, capable of withstanding some 300 lbs. pressure, lined with tin to resist the acid, and suspended by straps under the deck beams. These vary in number, according to the requirements of the size of the ship, and preferably are about 26 inches in diameter by 9 feet in length, so that each holds about 448 lbs. bicarbonate of soda mixed with water to a paste. Domes, B, extend upward from the generators to a height of 36 inches, and through these the chemicals are admitted. In each generator (as shown by the broken-away portion of one) is a horizontal shaft on which agitating vanes are spirally disposed. When these shafts are rotated, by means of the bevel gearing, C, and cranks, D, a slowly moving current of acid is carried through the soda, and thorough mixing insured. Each dome has a hinged removable cover, Fig. 2. When these covers are closed, they are turned beneath lugs on the dome, and the cap proper is tightly adjusted by lever and screw. Opening outboard is a water supply pipe, E, which communicates with two branch pipes, F and G, respectively above and below the generators. The pipe, F, serves to conduct water to the latter. The pipe, G, may be used as a waste pipe, as it leads outboard on the other side of the vessel; or when the valve, H, is opened, and the valve, I, closed, it conducts water from E, into the cylinders from below, to break up the caked residuum before discharging the same overboard. The acid reservoir, J, is firmly secured on the bottom of the vessel. It is thus situated apart from the other machinery, so that the corrosive action thereon of its contents is avoided; while, if it should leak, no harm would be done, as the acid would simply run into the bilge. The cylinder which has a capacity of 213 gallons is made of one quarter inch lead reinforced by an iron shell, which, while strongly backing and holding the weaker metal, may be easily removed when the inner case needs repairs. The reservoir is charged from the deck above through the pipe, K. The vessels, L, are intermediate and distributing receptacles, to hold the acid in small amounts until needed, and also to apportion the charges to the respective generators. They are of copper, lead-lined; they possess gauges for showing the level of their contents, and are directly connected with the domes, B, by pipes, M. To fill these vessels, a pipe is provided which extends into and near the bottom of the acid reservoir. From this, branch pipes lead to the separate chargers. An air pump, N, the lever of which is shown in the hands of the figure, forces air by a small pipe into the acid cylinder; and the pressure generated drives the acid up through the conduits and into the chargers, L, in quantities as desired. Valves are provided, so that one or all of the chargers may be filled. The alkali generators have like valves in the water pipes, so that water may be admitted to as many as needed.

The carbonic acid gas may itself be used for forcing up the acid by causing the pressure generated in a portion of

[*Continued on page* 388.]

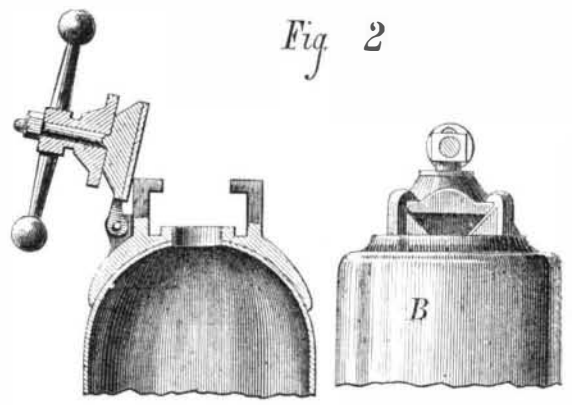


GRANGER'S APPARATUS FOR EXTINGUISHING FIRE ON SHIPBOARD.—Fig. 1.

[*Continued from first page.*]

the apparatus to act so as to drive the liquid up into the other parts. This is done by a simple adjustment of valves and connections which need not here be explained. Steam may also be conducted to the acid reservoir to serve the same purpose. A water trap, O, is provided in the air pump pipe, which prevents the acid fumes from injuriously affecting the working parts of the pump. The pipes, P, connecting the domes with the chargers, serve to equalize the pressure between the two, and to permit the free passage of the acid down to the generator, when the chemicals are to be mixed, by preventing a vacuum above the acid. Each dome, by means of a horizontal distributing pipe, Q, with suitable vertical branches, communicates with the gas holder or purifier, R, into which the generated gas is thus conducted. The purifier is a cylindrical vessel, which is imperforate at the points where the entering gas strikes it in issuing from the branch pipes; and between these pipes it is perforated to admit the passage of the gas. The object of this partition is to eliminate the solid and liquid particles which are mechanically carried up on the form of spray, by causing them to impinge against the imperforate portion of the diaphragms. The gas then passes to the hose, S.

In order to remove the collected impurities from the purifier, a pipe, with suitable valve, leads from the bottom thereof to the discharge pipe, G. In this way, water may be led in from the main supply, E, and also discharged through the same pipe. The latter also serves as a drain for any of the liquid contents of the generator which might surge up into



GRANGER'S APPARATUS FOR EXTINGUISHING FIRE ON SHIPBOARD.—Figs. 2 and 3.

the holder; and thus it operates as an equalizer to restore the said liquid to the generators. In order to introduce the gas into the burning vessel, without causing it to entrain air with it, the nozzle, T, Fig, 3, has a tapered screw-threaded swiveling sleeve, U, which is provided with handles, and which may be screwed into a hole of any size bored in the deck. An attendant at the nozzle is thus dispensed with, and the latter is firmly held airtight. An extra pipe, V, is connected to the distributing pipe, and leads into the open air so as to prevent the escape of the gas into the room through the safety valves. There is a separate safety valve on each dome, and also one on the purifier, which is arranged to blow off into the atmosphere at a lower pressure than those on the domes, in order to insure that no gas shall escape between decks. Pressure gauges are also arranged on each generator, and one is provided to indicate the pressure applied upon the acid in the reservoir.

The apparatus, we learn, is already in use on the Protector, a vessel now used to prevent fire among shipping in the harbor of New Orleans. It is equally well adapted for use aboard the ship it is to protect, or upon a small vessel, as above noted, to serve as a floating chemical fire engine in ports. Within two months last year it was the means of extinguishing fire on three cotton-loaded vessels in the above-named harbor. These ships carried respectively 1,400, 900, and 3,200 bales of cotton, and were valued with their cargoes at an aggregate sum of $375,000. We are informed that, with the exception of the bales of cotton which had actually been on fire, in two of the vessels the cotton, after the flames had been subdued, was discharged "in as good order and condition as it would have been at port of destination had there been no disaster." In the third vessel, water was employed by the firemen; but the fire was subdued by the gas. In one instance the flames, which were rising twenty-five feet above the hatches, were brought under control in twelve minutes after the gas had been admitted to the ship. The importance of this invention in such cases as the above is especially great; as cotton, when soaked with water, becomes much deteriorated in value. The United States Board of Inspectors examined the vessels saved. This body, in an official report, recommends the adoption of the apparatus aboard all steam vessels. We need not point out the advantages of the invention to passenger-carrying ships. Even on a man-of-war, where rigid discipline prevails and where fire is provided against by an elaborate system of drill, the outbreak of a fire at sea is apt to produce a panic, as was recently the case aboard the Egyptian cruiser Latif in the Red Sea. On an ordinary ocean steamer, crowded with people, the terrible confusion can be easily imagined. Amid such a state of affairs, it is difficult to collect enough cool-headed people to aid in managing the usual appliances; and every moment of delay in getting the flames under only intensifies the general fear. In such cases the apparatus which we have described, which silently and quickly smothers the conflagration, might well prove invaluable.

Patented through the Scientific American Patent Agency, January 2, 1877. For further information, address the inventor, Mr. A. M. Granger, Exposition Building, New Orleans, La.

Preserving Metals.

For preserving metal and other substances from decay and fouling, Mr. Charles Weightman Harrison, of South Kensington, London, Eng., proposes to dissolve the crystalline hydrocarbon known as ozokerit in any of its solvents, such as benzole, petroleum, oil of turpentine, or resin oil, and he then mixes the solution in any desired proportion with other suitable bodies according to the purpose for which it is required. He mentions that his experiments have been made with ozokerit as a type of the mineral hydrocarbons, which are built up of molecules containing not less than 20 atoms of carbon, such minerals being capable of resisting the action of all acids at ordinary temperatures, and suffering no deterioration from atmospheric influences. On this account he has found them valuable for mixing with gums, resins, and colors applicable to a great variety of purposes for preserving, as they impart thereto a high degree of permanence. He explains that a simple and ready mode of preserving bright metals from rust is to rub them over occasionally with a wax formed by melting together equal parts, or nearly so, of ozokerit and beeswax. It is easily applied in a thin coat by rubbing the compound on the metal with a cloth. In applying this compound wax to iron, he sometimes adds finely powdered plumbago to give it the color of the metal. Another compound or solution for preserving metals he forms by dissolving in a sand bath (say) 4 ozs. ozokerit and 4 ozs. marine glue in 2 lbs. benzole, and then adds 4 lbs. linseed oil and ½ lb. essence of turpentine. The mixture is kept gently boiling in the bath for an hour or so, after which it is ready for use, and may be applied to the metal by a soft brush, as in ordinary painting. In some cases he impregnates the surface of the metal deeply by forcing the compound of ozokerit into the pores by exhaustion or pressure, or the two combined. A convenient apparatus, which he uses for this purpose, consists of a metal cylinder, such as a wrought iron boiler of a suitable size and strength, equal (say) to about 200 lbs. to the square inch, fitted by connections with exhaust and pressure pumps in a manner which is well known. This cylinder is provided with an airtight door and a safety valve. When the metal articles have been placed in the cylinder, the air is exhausted to about 27 inches of mercury, and the hydrocarbon fluid is then admitted through a connecting pipe until the articles to be impregnated are covered. The pressure is then put on, and the fluid forced into the exhausted pores. He also claims painting or coating metals with a compound formed by melting together about 5 lbs. of ozekerit, 5 lbs. resin, and stirring the fluid in 2 gallons rectified spirit (65° over proof), in which 2 lbs. gum sandarach and 2 lbs. garnet lac have been dissolved. Add turpentine varnish to them, and boil at a gentle heat for an hour or so. Filter through a fine cloth, and preserve for use. He forms a protecting varnish for suspended or open air telegraph wires by coating them with a fluid, formed by mixing together and heating at a low boiling point for a short time, ¼ lb. ozokerit, ¼ lb. gutta percha or india rubber, 1 lb. rectified resin oil, and 2 lbs. linseed oil varnish. As varnish for outdoor ironwork he proposes to dissolve, in 2 lbs. tar oil, ½ lb. ozokerit and ½ lb. resin, mixed while hot in an open pot. The invention also includes a process of poisoning barnacles with strong tonic bitters—Angostura and the like—or weak strychnine; but these not being of direct interest to manufacturers or miners, they need not be referred to.

American Fruit in Europe.

Europe is now taking a surprising quantity of American fruit. The purchases have amounted, according to the New York *Tribune*, to over $2,500,000 worth since June, 1876, compared with $600,000 in the same period the year before. Dried apples figure largely in this movement. This country has exported over 12,000,000 lbs. of them since last June, as compared with 522,000 lbs. the previous year. This new addition to the trade of the United States is due to invention, which has occupied itself of late with improved methods for drying and preserving for transporting fruit. The greatest progress has been made in the way of dryers. Within a year some notable inventions in this line have been perfected which are a great acquisition to the resources of the country. The fruit dryer bids fair hereafter to be as much of a necessity to every farming community as the cider mill and the cheese factory.

ACCORDING to the Philadelphia *Trade Journal*, Mr. Peabody, the inventor of the Peabody rifle, receives about $300 a day in royalty.

Communications.

Our Washington Correspondence.

To the Editor of the Scientific American:

In my letter published in No. 22, I mentioned that S. D. Locke had applied to Secretary Schurz for an order directing the Commissioner of Patents to re-hear a case decided against the applicant by Assistant Commissioner Doolittle, which application the Secretary denied. Mr. Locke has since applied to Judge Humphreys of the District Supreme Court for a mandamus directing the Commissioner of Patents to re-hear the case. The hearing was set for May 22, but was postponed until a later day; and on the second day set, the Judge again postponed the case until the fall term.

Under a recent examination of third assistant examiners, in which seventeen competed, Messrs. C. J. Hedrick, F. S. Williams, and R. J. Fisher were appointed second assistant examiners. To fill the vacancies thus made in the ranks of the third assistants, another examination has just been held, in which sixty-five competitors took part, the result of which has not yet been announced, but probably will be before this is published.

The managers of the French Exposition of 1878 have informed our government that, if the United States is to take part in the Exhibition, it will be necessary that immediate steps be taken for representation in the American section. The Secretary of State, by direction of the President, has now under consideration the proper measures to be recommended to the Cabinet to form a basis of a plan of representation of the United States Government and people at the Exposition. Both the President and Secretary express their regret that no action was taken by Congress at the time the notification of the proposed Exhibition, submitted to the Secretary of State by M. Bartholdi, was transmitted to that body. The letter of the late Secretary of State transmitting the notification was accompanied by no recommendation of a plan of representation, on account, it is said, of the dissatisfaction entertained by the late Administration with the action of some of the French Commissioners during our own exhibition. President Hayes and Secretary Evarts, on the contrary, are extremely anxious that some representation should be had, particularly in view of the fact that the French Commissioner Sommerard's conduct was satisfactorily explained. It is thought probable that the best plan will be to appoint a Provisional Commission, with the understanding that the Commission will not be paid unless Congress, when it meets, makes suitable appropriations, and that by this means arrangements may be made for the shipment of articles by American exhibitors. There is no constitutional impediment to this course, and the Secretary thinks there will be no doubt about Congress making the necessary appropriation when it meets in October. The minimum amount wanted for this purpose is said to be about $300,000. Several prominent gentlemen associated in the administrative branch of the Centennial Exhibition and now connected with the Permanent Exhibition, in a recent informal interview with Secretary Evarts, said, as they had the machinery for such work now in efficient organization, they would be happy to co-operate in any way that he might feel disposed to utilize their services. Another plan suggested by a number of prominent American manufacturers of machinery is that some person now in Paris connected with the State Department may be temporarily detailed to take charge of such shipments as may be made until Congress can meet and make the necessary appropriation.

Our Consul at Berlin has submitted to the Secretary of State a prospectus of the Leather Exposition, which is to be held in that city from the 8th to the 24th of September, and recommends that the American manufacturers of that necessary article send exhibits of their wares, which he thinks will turn out very beneficial to the leather trade.

From the Spanish Minister, Secretary Evarts has received a notification that an International Exhibition of Fine Arts will take place in Madrid in January of next year, under the auspices of his government.

Our Consul at Odessa, in a late report to the State Department, has the following: "Agricultural implements might be sent in great quantities to this country if our manufacturers would make an effort in that direction and adapt their implements for the use of the peasantry here. The principal thing to be done is to make them exceedingly firm and strong. American reapers and mowers are now the favorites above all others, and have a large sale. In other machinery the English manufacturers have the field, and I have seen no article of their manufacture that excels the American, unless expensiveness be deemed an excellence. I am persuaded that there is a fine field here for the American threshing machines. During the year an American firm has supplied a railroad here with fifty-five locomotive engines. They were remarkable in strength, power, and workmanship; and I am told that they draw a train easily through heavy snows that, with the engines formerly in use, would have been impassable."

Some three or four years ago, Congress appropriated $100,000 to be expended in experimenting on steam boiler explosions, to discover if possible the cause of some of the mystery that is believed by many to be connected with these accidents, which mystery, however, is generally believed by the best informed engineers to consist in low water. During the then ensuing season, a Commission, of which the Supervising Inspector of Steam Vessels was the chairman, made a series of experiments at Sandy Hook, and about one half of