

IMPROVED LUBRICATOR.

We illustrate in the accompanying engraving a new lubricating device, claimed to ensure a continuous and economical flow of oil or similar lubricating material into the cylinders of steam engines, and, besides, to possess many improvements and advantages in general construction.

The oil is poured into the cup, A, Fig. 1, and descends by the glass tube, B, into the circular receptacle shown. At C, the apparatus is attached to the cylinder, the steam from which, when the valve, D, is opened, passes up the tube, E. This tube is movable in the direction of its length and is held tightly in stuffing boxes, as indicated in the sectional view of its upper portion, Fig. 2. G is the condensing surface, so that the steam, emerging from the end of tube E, fills the intermediate space between said tube and the inner periphery of G with water. It is clear that, by moving tube E up or down so as to bring its upper end nearer or further from the cover of G, the condensing surface will be decreased or augmented so that less or more water will pass by pipe H, and mingle with the oil in the reservoir. The effect of this addition of water is to displace the oil, raising the latter back through glass tube B and pipe H into G, and thence down tube E into the cylinder at C. The glass tube, B, affords a convenient means for the engineer to perceive the amount of oil in the apparatus, and also to know when the water entirely displaces the lubricating material in the reservoir, a fact indicated by its appearance at the bottom of the tube. There is an opening in the lower part of the reservoir which communicates through pipe I and valve J with the bent conduit shown, thus allowing the contents to be drawn off at will. The valves at J and at A are provided with screw thread collars, which secure them in place and through which their stems freely work. This is designed to obviate the difficulty, which arises when the thread is on the valve stem, in screwing the plug down on its seat in case of any foreign material stopping the way. With the present arrangement, the collar is the securing portion, while the stem may be turned around so as to grind the valve into its seat.

The inventor informs us that he has had this device in use for some time past and has experienced uniform success. The flow is constant and unobstructed, while the expenditure of oil is reduced to a minimum. The construction is strong and durable, and the apparatus generally appears to us as showing considerable ingenuity as well as being well adapted for its purpose.

Patented through the Scientific American Patent Agency, January 7, 1873. For further particulars address the inventor, Mr. James McL. Power, Port Townsend, Washington Territory, or at Warren, Trumbull county, Ohio.

Testing Alcohol.

It is customary to obtain the percentage of absolute alcohol and water in mixtures of alcohol by taking the specific gravity with a hydrometer especially adapted to the purpose and called an alcoholometer. When a liquor contains sirups and extractive matters, the specific gravity fails to indicate the amount of alcohol present. In such cases it has been necessary to distill off the alcohol and then measure it.

In these cases, and also where no alcoholometer is at hand, or the quantity of the liquid is too small to float one, Vogel's method may be employed. He found that, when dry starch paper was dipped into a solution of iodine in alcohol of 66.8 per cent or over, the starch was not turned blue. If the spirits contained less than 66.8 percent absolute alcohol, the paper is immediately blue. To apply the test to weaker alcohols, it is only necessary to add

absolute alcohol until the reaction no longer takes place. From the quantity added it is easy to calculate the percentage. If the spirit tested is above 66.8, water is added from a graduated measure until the starch paper turns blue, and the percentage calculated from the quantity of water added. If potassium be thrown upon alcohol of specific gravity 0.830.

Here are exhibited the choicest articles of workmanship, embracing those forms of art which, for ages, have satisfied the popular tastes of Japan, but which, under the rapidly improving ideas of her people, will soon for ever disappear. Remarkable sea monsters of grotesque form, birds, vases, globes, etc., having the appearance of solid materials, elaborately adorned, but in reality composed of paper, stretched and supported on bamboos, surprise and interest the visitor on every side. The display of Japanese trappings for horses, vehicles, saddles, bridles, and equestrian equipments is quite extensive and includes many peculiar forms. For example, instead of a stirrup like ours, the Japanese use a piece of wood bent at a sharp angle, to one end of which the stirrup strap is attached, while the foot rests on the portion below, which hangs horizontally. The stirrup is beautifully decorated. The wealthy Japanese, when they ride, present a gorgeous appearance, the animal being covered with gold-plated straps, bridles, and fringes, while the dress of the rider is adorned with golden emblems, and his belt filled with costly swords.

The show of Japanese arms is very fine, especially the collection of swords. These are of curious forms and elaborate workmanship, great pains being taken in the ornamentation of the hilts. The steel is of splendid quality. In their mental power and readiness to appreciate the ideas and appliances of modern nations, the Japanese are decidedly in advance of other Eastern peoples; and now that the government is so fully committed to the re-education of the people, on the basis of Western civilization, the nation will soon take a high rank. Large numbers of Japanese young men, from the prominent families of the Empire, are now being educated in Europe and this country. At the Vienna Exposition a special delegation of Japanese students and officials are employed to copy and procure information about everything which they consider to be useful for introduction into Japan.

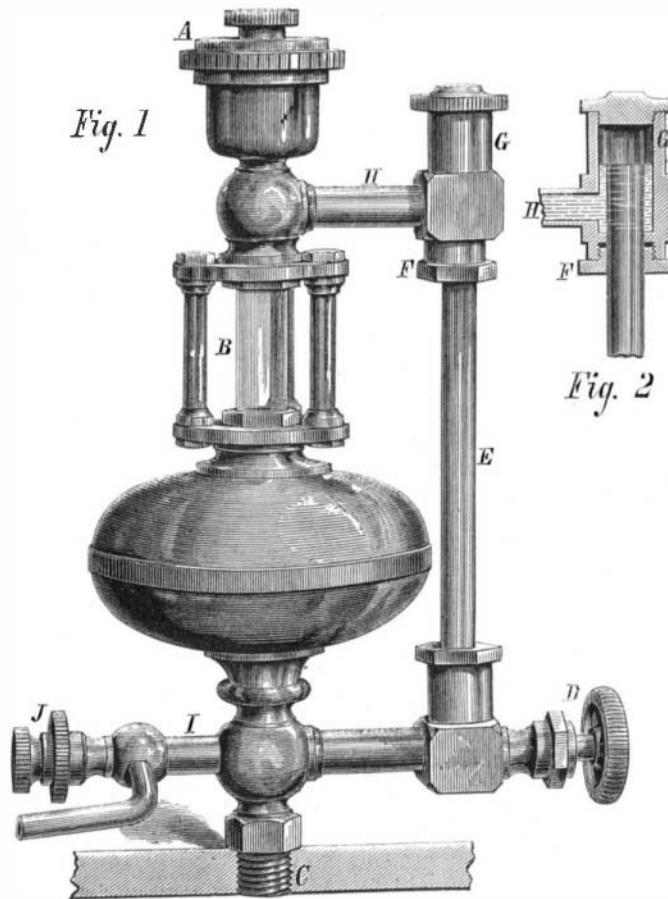
POTATO BLIGHT AND ROT.

Dr. Thomas Taylor, of Washington, D. C., communicates to *The Lens* the result of experiments upon potatoes, for the examination into the chemical and structural theories of Dr. Lyon Playfair and the fungoid views of several leading mycologists. Among other tubers, one half of a potato brought from Santa Fé, New Mexico, was placed in water with a diseased specimen and the other half

in water to which sugar had been added. An Ohio potato was similarly arranged, and the effect of allowing it thus to remain for a considerable period noted. On the twentieth day, the Ohio specimen had entirely dissolved, while the Santa Fé potato was uninjured. Comparing the portions in the sugared water, the Ohio tuber appeared a mass of infusorial life, mycelium, and budding spores, with a strong odor, no starch cells being discernible.

The New Mexican specimen showed few infusoria, and the starch granules arranged in cellulose, between which bundles of mycelium and budding spores appeared in profusion. No liberated granules were visible. Since the experiments, other northern and eastern varieties have been tested by fungoid solutions in contrast with some of the New Mexican varieties, giving like results, clearly demonstrating the superiority of the Santa Fé potatoes, over all others thus far examined, in respect to their powers of resisting fungoid and infusorial action.

We note that the government is about to test, by samples



POWER'S IMPROVED LUBRICATOR.

it takes fire; but with spirits of specific gravity 0.823 and under, it will not take fire.

THE JAPANESE DEPARTMENT AT VIENNA:

Among the most interesting displays of Oriental productions at the Vienna Exposition is the Japanese department.



THE JAPANESE DEPARTMENT, AT THE VIENNA SHOW.

of every variety of potato from the above mentioned locality, their anti-fungoid qualities in the open field and in contrast with the usual varieties grown in that section of the country.

THE NEW EXPLORATION OF THE AMAZON RIVER, BY PROFESSOR ORTON.—UP THE AMAZONS.

No. 8.

A THOUSAND MILES ON THE GREAT RIVER.—SCENERY.

A voyage on the Amazons is excessively monotonous. A vast volume of smooth, yellow water, floating trees and grass, low, linear-shaped islets, a dark, even forest, the shore of a boundless sea of verdure, and a cloudless sky with occasional flocks of screaming parrots, these are the general features. No busy towns are seen along the banks; only here and there a palm hut or Indian village, half buried in the wilderness. No mountains break the horizon, only a half a dozen table-topped hills; and while many bluffs of red and yellow clay are visible, they are exceptional, the usual border being low alluvial deposits, magnificently wooded, but half the year covered with water. The real grandeur, however, of a great river like this is derived from reflecting upon its prospective commercial importance and immense drainage. A lover of Nature, moreover, can never tire of gazing at the picturesque grouping and variety of trees with their mantles of creeping plants; the wild, unconquered race of vegetable giants; the "reckless energy of vegetation," compared with which the richest woods on the Hudson are a desert; the dense canopy of green, supported by crowded columns, branchless for fifty or eighty feet; the parasites and undergrowth struggling for life; the broad-leaved bananas and gigantic grasses; the colossal nut and pod-bearing trees; and above all the hundreds of species of palms, each vying with the other in beauty and grace. Through such a densely packed forest flows the Amazons with all the grandeur of an ocean current.

In giving our voyage up the great river to its source among the Andes, we shall touch only at representative points, and confine ourselves mainly to such commercial and industrial facts as will be likely to interest the practical man. From Pará to Santarém, the first town of importance, is 543 miles. The passage can be made by steamer once a week, sometimes oftener; fare, \$25; time, four days. Twenty hours after leaving the capital, the steamer stops at the little village of Breves on the southwest corner of the great island of Marajó. Rubber is the chief article of export. Here begins a labyrinth of narrow channels connecting the Amazons with the Pará; and as the forest is usually luxuriant, the sail through to the Great River is the most memorable part of the whole voyage. Here the palms are seen in all their glory; the slender assaí and jupatí with their long, plume-like leaves, the mirití with enormous fan-like leaves, and the bussú with stiff, entire leaves, some thirty feet long. The banks are frequently bordered with heart-shaped arums and waving arrow grass, or with plantations of the cacao tree and mandioca shrub.

The first view of the Amazons is disappointing, as it is nearly filled up with islands, but where the Xingú comes in, it shows its greatness, being ten miles wide. At the mouth of this tributary is situated the pretty village of Porto de Mos, now numbering but 800 souls, but destined to be an important center in the rubber trade, while the country up the Xingú is admirably adapted for coffee. Passing the singular hills of Almeirém and the rightly named village of Monte Alégre, famous for its cattle, we reach

SANTAREM

at the mouth of the Tapajós. This ambitious but, to an American, sleepy looking city is the half-way station between Pará and Manáos, and is now aspiring to become the capital of a new province, to be called Baixo-Amazonas, extending from Obydos to Gurupá. It is not thriving, however, barely maintaining its old number of 2,500 souls. Of these about 2,000 are Indians, Negroes, and mixed, including two hundred slaves. The situation is beautiful, lying on a green slope facing the clear Tapajós, with undulating campos and flat-topped hills in the rear. Three or four long rows of low, whitewashed, tiled houses, with less than half a dozen two-storied buildings and one Jesuit church, make up the city. There is a "Collegio" for boys and girls, the former department having fifty students varying in age from eight to sixteen, and a course of four years for the study of grammar, arithmetic, geography, history, French, Latin, algebra, and geometry. Just now there is a conflict between the Jesuits and the Masonic order, the government siding with the latter. The priest declared from the pulpit he should obey Rome rather than Rio. The climate of Santarém is delightful, the trade winds tempering the heat (which is seldom above 83°) and driving away all insect pests. The chief diseases are syphilis and fevers. Dr. Stroope, an immigrant from Arkansas, is the sole physician. The soil in the immediate neighborhood is sandy and poor; but inland, especially, where the

AMERICAN COLONISTS

have located, it is exceedingly fertile, rice, for example, having a yield of seventy-five bushels to the acre, and tobacco, one thousand pounds. The great want is a laboring class; there are too many shopkeepers and too few workers. Yet such as are willing to work can be hired for fifty cents a day. One paper, a foot square, is published weekly. The following prices will give some idea of living at Santarém: Wheat flour (mostly from Harper's Ferry, U. S.) costs \$16 a barrel; and New York goods generally sell at three times their original value, the chief addition being made at the custom

house at Pará. Agricultural implements are at double their price. Butter (all from England and the United States), 80 cents a pound; Holland cheese, 75 cents; Newfoundland codfish, 20 cents a pound; Lowell domestics, from 25 to 40 cents a meter; sawn lumber, \$20 a hundred. Of home productions, cacao sells in the city from \$2.10 to \$2.20 an arroba (32 lbs.); coffee from 16 to 24 cents a pound; sirup (no sugar is made), 40 cents a frasca (5 pints); maize, \$2 a bushel; cachaga rum, 50 cents a gallon; peanuts, \$2 a bushel; Brazil nuts, \$1.50 a bushel; farina, \$5 a bushel; tobacco, \$1 to \$1.25 a pound; lime, \$3 a barrel; pork, 35 to 40 cents a pound; beef, 7 to 9 cents a pound; hides, at the ranchos, 5 cents a pound, at Santarém, 7 cents a pound, at Pará, 12 to 14; cattle, at the ranchos, \$15 to \$20, at Santarém, \$35 to \$28, at Pará, \$35 to \$50; horses, at the ranchos, \$35 to \$40, at Santarém, \$40 to \$50, at Pará, \$50 to \$100.

The best paying business at Santarém would be in the manufacture of brick, leather, and lumber. The only articles manufactured are cajú wine, cachaga, soap, and lime. Nearly all the following exports, given in the order of their valuation, come down the Tapajós: Rubber (about 7,000 arrobas annually), cacao, hides, dried beef, fish, farina, salsaparilla, tobacco, guaraná, copaiba oil, Brazil nuts, tal low, cattle, horses, and lime. Coffee, sugar, and rice are imported from below, although hardly any part of the Amazons valley would produce more. Rubber gathering has not only killed agriculture, but drained the district of 2,000 inhabitants.

Santarém is of interest to the American reader as it was selected for colonization by emigrants from the Southern States. Most of the colonists have left, only six families remaining; but these contain nearly all the enterprise and intelligence of the motley party that left Mobile in 1867. These have chosen their plantations on the slopes of the hills, six miles south of the city, and are astonishing the Brazilians with the results of their industry. The land is rated at 22 cents an acre; but practically the colonists enjoy "squatter sovereignty," pre-empting a square mile, and paying no taxes except on exports. They can sell their improvements, but not the land. The soil is black and very fertile. It beats South Carolina, yielding, without culture, 30 bushels of rice per acre. Sugar cane grows eight feet high, or twice the length of Louisiana cane, and fully as sweet. Sweet potatoes grow naturally; indeed it is impossible to exterminate the plant. Broom corn and cotton grow luxuriantly. Indian corn does not mature well; turnips grow finely, but do not come to seed; grapes do well, but the ants devour them. The following

VALUABLE VEGETABLE PRODUCTS

abound at the American settlement: abio, ata, pine apple, pikiá, papaw, aracá, ingá, abacati, bread fruit, orange, banana, cocoa nut, peach palm, cupuassú, cajú, cará (or yam, four or five kinds), three kinds of mandioca, tomato, pepper, ginger, Brazil nuts, tonka bean, sugar cane, sweet potato, squash, Lima bean, rice, tobacco, indigo, and pita; while in the dense forest we find the following trees, many of them unknown to commerce, but furnishing the richest cabinet woods or timber: itaíba (often 60 feet high and 4 feet through), cedar (specimens of which occur 100 feet high and 7 feet in diameter), jutahí (a very hard, dark wood, used for sugar mill rollers, etc.), sapucaya (resembling hickory, the clear trunk of which is often 50 feet high), loira (the pine of the country), moira-pushúva (similar to black walnut), cumarú, sapupéra, macacaúba (very close grained), acariúba (very durable), javána, rosewood, prauúba (very hard), pao-mulatto, pao-prito, pao-d'arco, and andiróba. With Nature so generous, with a healthy location at the outlet of the rich Tapajós, and, though 500 miles from the sea, accessible to Atlantic vessels of heavy tonnage, Santarém is sure of a brighter future. From Santarém to

MANAOS,

the capital of the upper province of Amazonas and the second city in magnitude on the river, is 460 miles. Three villages of importance are passed in this voyage: Obydos (seated beside a bluff on the "narrows," where the river, contracting to a strait not a mile wide, has a depth of forty fathoms and a current of 24 feet per second) exports considerable cacao and Brazil nuts. Villa Bella, insignificant in itself, is the outlet of a large and rich inland district, exporting cacao, guaraná (from Manés), piraracú fish, bast, Brazil nuts, tonka beans, tobacco, coffee, caferána, copaiba oil, hides, and beef, but importing almost every necessary of life. And Serpa, built on a high bank of variegated clay, nearly opposite the entrance of the Madeira, has a deep water frontage, where vessels might easily dispense with lighters, montarias, etc. But wharves and piers are yet to be on the Amazons. The excuse for not building them is that the great difference between high and low water (50 feet) precludes their construction. We think any experienced mechanic from the North could easily show that piers on the river are among the possibles, and at the same time reap a fortune for himself. One is greatly needed at Manáos, where sometimes twenty-five steamers unload every month.

On the left bank of the dark Rio Negro, ten miles from its junction with the Amazons, stands the St. Louis of Brazil, the city of Manáos. The site is admirably located for either residence or commerce. It is uneven and rocky, twenty feet above high water mark. The river in front is deep enough for the Great Eastern, and its banks for hundreds of miles are packed with a luxuriant forest of valuable trees. The soil is fertile in the tropical sense; and the climate is Neapolitan, Nature having left little to be desired in this respect. We did not see the mercury rise above 93° at mid-day, and the nights are invariably cool, with but few mos-

quitos. The country around is quite romantic for the valley, being undulating and covered with picturesque vegetation; while the *igarapés* or canoe paths winding through the forest are among the most beautiful features in the Amazonian landscape.

The city, for a long time stagnant, is now rapidly improving. As we saw it in 1867, it was meanly built, without a show of enterprise, without a hotel, and not 3,000 inhabitants. It now numbers 5,000 souls, with 17,000 in the district, a mixture of Brazilians, Portuguese, Negroes, Indians, Italians, Jews, Germans, and English; it has a fine cathedral, to cost, when completed, \$200,000, and a President's palace in process of construction; two hotels and a market, beside many elegant private houses. The city is lighted with 500 kerosene lamps, has day and night schools, with an *Episcopal Seminario*, three newspapers, one daily; and one two horse carriage, which is advertised "to let, rain or shine." But there is neither bank nor book store.

Agriculture, as everywhere on the Amazons, is dead; even farina, the bread of the land, is imported from Pará, although this is the mandioca country. In fact, there is a constant lack of food in the city.

PRICE OF LABOR AND PRODUCTIONS.

The only productive industry worth mentioning is seen in one steam saw mill, one brick and tile establishment, and one soap factory. Masons and carpenters get from \$2.50 to \$5.00 a day; pilots \$100 a month; and physicians \$5 a visit. The daily "Commercio de Amazonas" costs \$10.00 a year. Hotels, \$2 per day. The following prices, current the present month (August), will serve to illustrate life a thousand miles up the Amazons: Cacao, \$2.20 an arroba; tonka beans, 20 cents per kilogramme; puxurí (nutmegs), 90 cents per kilogramme; guaraná, 68 cents per kilogramme; Brazil nuts, 5 cents per kilogramme; copaiba oil, 70 cents per kilogramme; fish glue, 90 cents per kilogramme; dried meat, 21 cents per kilogramme; dried piraracú fish, 23 cents per kilogramme; vanilla, 45 cents per kilogramme; indigo, \$2 per kilogramme; salsaparilla in bundle, 80 cents per kilogramme; tucum thread, \$1.00 per kilogramme; tallow, refined, 90 cents per kilogramme; rubber, from 56 cents to 85 cents per kilogramme; rubber, in liquid, \$2.53 per kilogramme; aguardente (cane rum), from 15 to 20 cents a liter; tapioca, 20 cents a liter; piassaba in the rough, 12 cents per kilogramme; piassaba cord, 50 cents a centimeter; piassaba brooms, \$1.60 a dozen; estopa or bast, 9 cents per kilogramme; hides, 26 cents per kilogramme; cotton hammocks, from \$5 to \$14 each; tucum hammocks, feathered, \$45; cedar logs, \$1 per meter; cedar or itaúba boards, sixteen feet long, eight inches wide, unplanned, \$18 a dozen; cabinet wood in boards, 45 cents a meter; steamer fuel, \$20 a thousand sticks, each weighing on the average fifteen pounds*; native brick (8×6×2 inches) and tiles, from \$50 to \$75 a hundred, at Pará \$35; the ordinary red sandstone rock, which abounds in the vicinity, unworked, 75 cents a cubic foot.

DUTIES AND FREIGHTS.

The provincial duty on liquors is 25 per cent; on rubber, 12 per cent; on fish, 5 per cent; on all other articles, 10 per cent. If exported, 5 per cent extra is collected at Pará, besides fees. Rubber collected in Peru and Bolivia pays no duty. Steamer freight between Manáos and Pará, on rubber, 25 cents an arroba; on coffee and cacao, 24 cents an arroba; on Brazil nuts, 35 cents a bushel; on brick, \$20 a thousand; cotton, 30 cents an arroba; hides, 20 cents each; crude piassaba, 25 cents an arroba; salsaparilla, 30 cents an arroba; tobacco, 25 cents an arroba; boards, \$3.30 per dozen; beeves, \$7.50 each; horses and mules, \$10 each. Freights between Manáos and San Antonio on the Madeira; on rubber and salsaparilla, 40 cents an arroba; cacao, coffee, dried beef and tallow, 32 cents an arroba; Brazil nuts in sacks, 35 cents a bushel; hides 25 cents each. To Hyutanan on the Purús, the tariff is about the same.

The produce of the Rio Negro and Solimoens does not stop at Manáos, but goes directly to Pará, and must be purchased there. This is owing to the fact that Pará merchants have put the producers under obligation, so that producers up the river cannot sell at an intermediate place. But Manáos is determined to become independent of Pará; and the project of a through line of steamers from Manáos to Europe is on foot. With a healthy climate and fertile soil, a situation near the mouths of four great rivers, the Maderia, Negro, Purús and Juruá, and having water communication with two thirds of the continent, this city has commercial advantages unsurpassed. What it wants is an even and generous legislation and an industrial class.

JAMES ORTON.

Honors to Operatives and Foremen.

The Society of Arts and Manufactures, Vienna, has issued 134 silver medals, with diplomas, to operatives and foremen, recommended for the honor by employers who were exhibitors at the Exposition.

The distribution is as follows:

United States of America	5
Great Britain	10
France	18
Germany	13
Italy	9
Switzerland	5
Belgium	5
Holland	4
Portugal	5
Denmark	4
Sweden	7
Russia	5
Greece	3

*Cutting wood for the steamers is very lucrative. Many will soon go into the business with steam or horse power and make fortunes. The forest is free to all. The great difficulty in ascending high up certain tributaries is not so much the lack of water as the lack of fuel, there being no one to cut it.