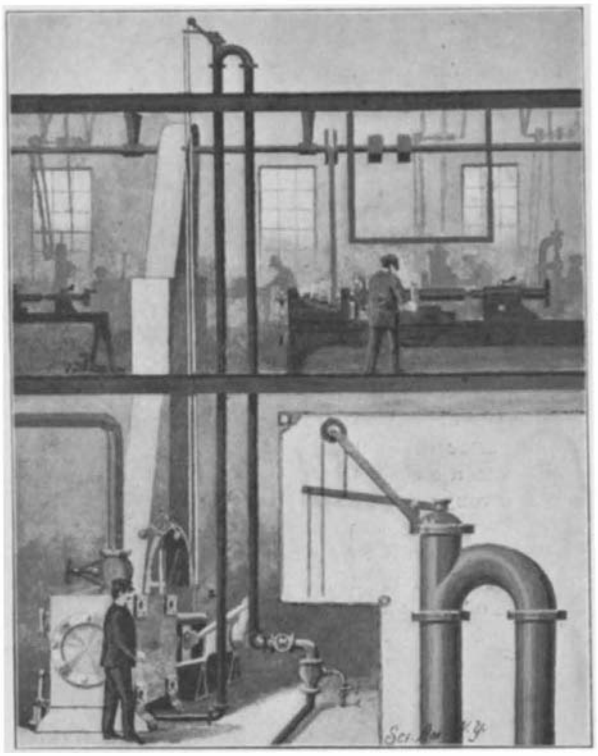
SAFETY DEVICE FOR ENGINES AND CONDENSERS.

A safety device which is arranged to keep the engine cylinder completely free from water in case the engine should act as a pump and the condenser is at a standstill, is an ingenious invention for which Mr. Thomas Grieve, of Perth Amboy, N. J., recently received a patent.

The exhaust of the engine passes to a condenser by means of an inverted U-shaped pipe, the upper portion of which is about 34 feet or more above the level of the water in the condensing chamber, so that when the steam is shut off in the engine, and the piston continues to move by reason of the momentum of the flywheel, causing the engine to act as a pump, the water contained in the condensing-chamber will not be drawn into the engine by way of the U-shaped pipe, since the upper end of the pipe is above the suction height of the pump. The exhaust steam is condensed by a jet of water. The condensing-chamber is connected with the pump to remove the water, the steam being instantly condensed and a vacuum produced in the U-shaped pipe. Should the pumps stop at any time and a vacuum be produced by the engine, the water contained in the condensing-chamber cannot be drawn by way of the U-shaped pipe into the engine for the reasons given.

In the elbow of the pipe an outlet is arranged, which is shown in the detailed view of the accompanying illustrations, and is normally closed by a valve engaged by a lever from the free end of which a rope extends downwardly. When the engineer pulls the rope, the lever will swing the valve off its seat, so that the exhaust steam can freely escape through the upper end of the U-shaped pipe without passing to the condenser. This is done when the steam is not to be condensed, and the valve controlling the passage to the condenser is closed. But when the steam is to be condensed, the valve in the elbow is closed; and in order firmly to hold the valve to its seat until the desired vacuum is established by the action of the circulating pump, a second rope is provided, passing over a pulley held on a bracket, the upper end of the rope being connected with the lever. When the engineer pulls upon this second rope, the lever will be swung upward to press the valve firmly to its seat. The vacuum can be easily broken whenever it may be necessary by means of a valve or plug cock.

The principle underlying this invention can be applied for central condensing purposes, or for one air-pump used in connection with any number of engines, the condensing-chamber suction leading to one main suction and thus to the pump. This centralization of the condensing system by leading the exhaust steam



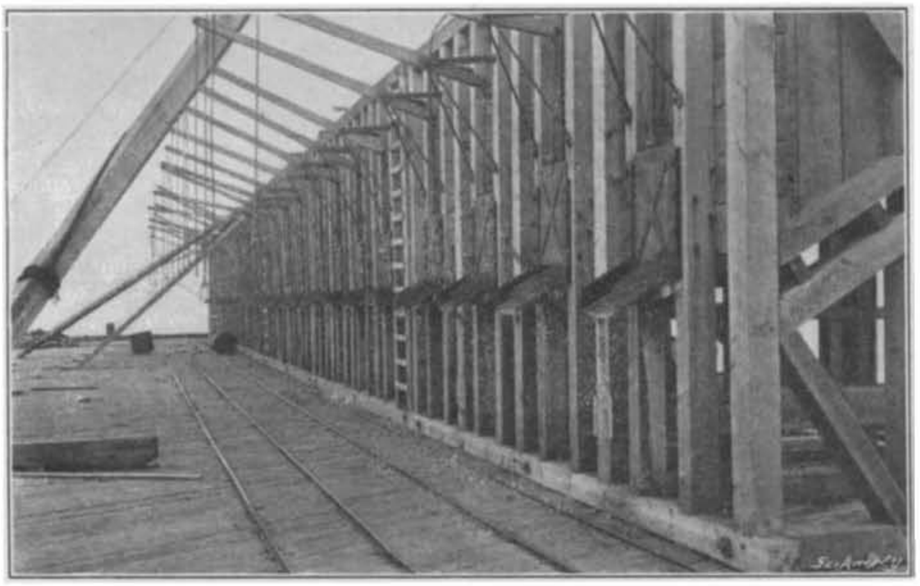
THE GRIEVE SAFETY CONDENSER.

from each engine to one large exhaust in turn leading to the condenser, is commonly found in very large plants. The arrangement necessitates the employment of large expensive pipes and valves. With Mr. Grieve's system, the expense of installing this elaborate system of piping would be very materially reduced. Moreover, if the conditions were such that the condensing-chamber could be raised above the pump, the space below the condensing-chamber would be filled with water by gravity; and since every 2.3 feet of water are equal to one pound per square inch, and one pound is equal to 2 inches of vacuum, the pump would be relieved of that much work. Mr. Grieve has subjected his condenser to severe tests, and informs us that it works satisfactorily in every respect.

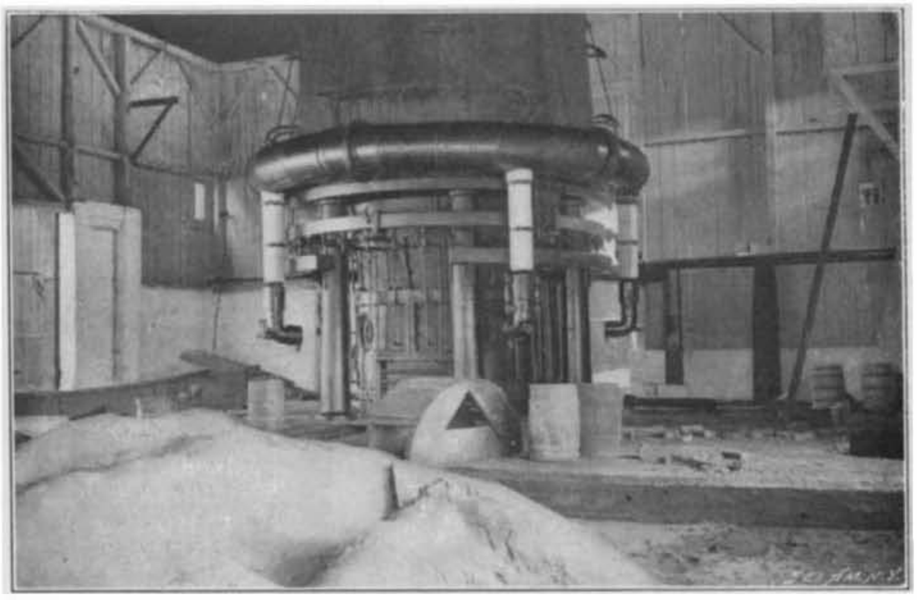
IRON MAKING ON THE PACIFIC COAST.

An event of no small importance is the recommencement of iron making on the Pacific Coast, which will take place shortly at Irondale, some five miles south of Port Townsend, Washington. Here, nearly one-quarter of a century ago, was erected the first blast furnace on the Pacific Coast. The venture, after being in operation for a matter of twelve years, proved a failure, and the plant was shut down. After the expenditure of a quarter of a million of dollars in prospecting and developing iron mines, experimental work with fuels, the installation of new machinery and the repair of the old plant, the Pacific Steel Company, a corporation in which practical iron-makers of Pennsylvania are the principal owners, is now in condition to commence work where the defunct Puget Sound Iron Company abandoned it twelve years ago.

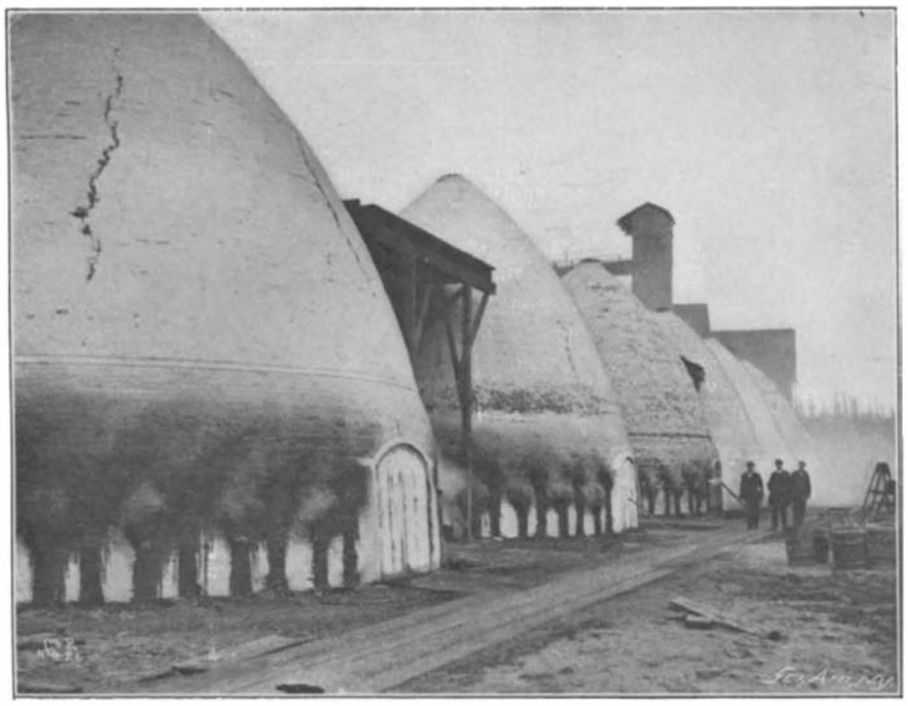
It is a fact that practically every pound of iron and steel which the Pacific Coast consumes or sends over sea to foreign markets is brought from points east of the Mississippi River; and it is claimed that at the present time competition with the iron works of the East is all but impossible, on account of the necessarily prohibitive freight rates on the raw materials. Some three years ago the present vice-president of the Pacific Coast Steel Company commenced an investigation of the iron mines on Texada Island, B. C., from which the ore used in the abandoned plant had been brought, and also thoroughly examined the coke and charcoal made on Puget Sound. Many tons of various Pacific Coast coals were sent to McKeesport, Pa., and there coked side by side with Pennsylvania coals, and the results compared. As a result of these investigations, the vice-president, Mr. Swaney, purchased the abandoned plant of the Puget Sound Iron Company, and work was opened up once more at Irondale. The furnace was relined, the machinery for crushing and hoisting ore was overhauled, and the steam plant improved with a view to securing more economical power production, this refitting being car-



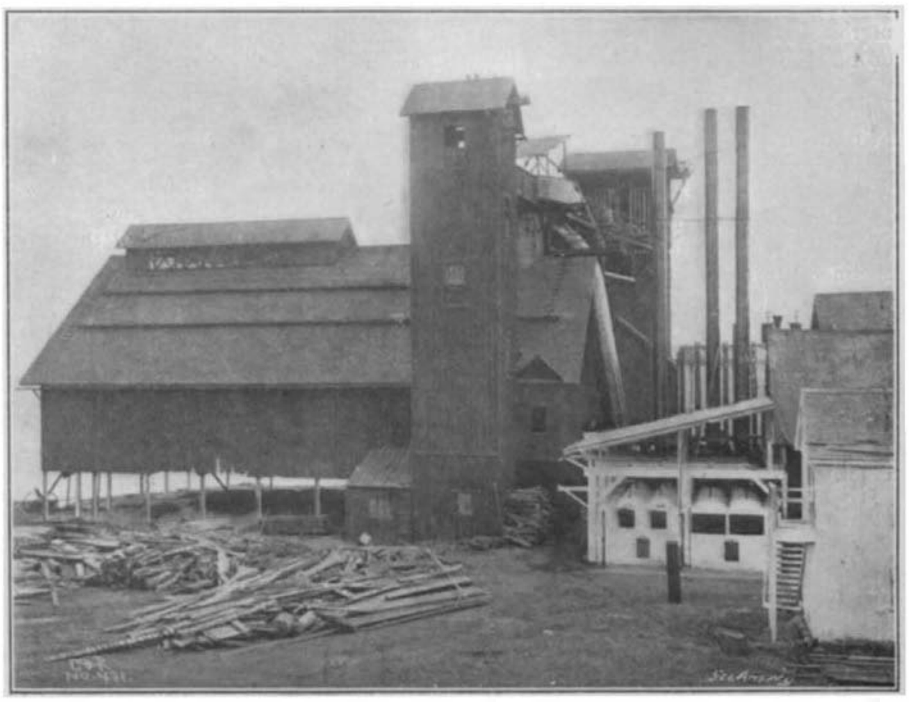
Ore-Bunkers on the Wharf.



The Blast Furnace, Showing the Hot-Blast Tuyeres.



Row of Charcoal Burners.



Rear View of Plant, Showing Charging Platform of Furnace and the Boiler Plant.

IRON MAKING ON THE PACIFIC COAST.

ried out under the direction of the Wellman-Seaver Engineering Company, of Cleveland, Ohio.

The blast furnace, which is shown in two of our illustrations, is 50 feet in height, 12 feet in the bosh, 6 feet on the crucible, and has a capacity of 50 tons of iron per day. A battery of four steam boilers furnishes power to drive the ore-crushing and hoisting machinery and the blowers. The gases are conducted from the top of the furnace by a large pipe and are led into the boiler house, where they are burned under the boilers in the manner customary in our Eastern plants. Hot blast is used, the air entering the furnace through the five tuyeres shown in the illustration, at a temperature of from 900 deg. to 1,000 deg. The water for the supply of the furnace and steam plant is led by a wooden flume from Chimacum Creek, the flume being 3½ miles in length.

For the present the Irondale blast furnace will make use of the same grade of ore that was used when the plant was first in operation. This ore is brought on scows from Texada Island, British Columbia, which is 130 miles distant, and the Texada ore will be used until the value of the company's own mines has been determined. Moreover, the coke will be brought on scows from the Skagit Coal and Coke Company's ovens. Other cokes from Pierce County and British Columbia will also be tested experimentally. After the experimental work with coke is completed, it is the intention to run the Irondale furnace entirely on charcoal, and hence a great deal of attention has been given to the charcoal-making plant. The kilns of the former company will be used, but a large sum has been expended in improvements and additions and the new company expects to produce fuel at a considerably lower cost than at present.

The charcoal-burning kilns, which were built at a cost of $40,000, are twenty in number. They stand in a double row just east of the main building. They are built of brick, bound with iron bands, and covered with concrete. Each kiln is 30 feet high and 30 feet in diameter at the base, and will hold 75 cords of wood. Originally the kilns were filled by hand, but appliances are now being erected which will automatically feed the kilns with wood, ready for burning, at a cost of fifty-four cents a cord. The log "culls" and "seconds" unsuitable for sawing into lumber will be purchased of the large logging companies on the Sound, towed to the furnace, and placed in a boom in front of the charcoal kilns. The logs will then be towed to a logway by a workman, and from that time until it is taken from the kiln as charcoal there will be no handling of the wood. It is considered that a very promising feature, judged from the standpoint of economy, at this plant, is the cheapness of water transportation and the short distance over which the ores and fuel will have to be brought to the blast furnace.

Although the plant is not a large one, it is large enough to afford a thorough test of the problem of economical iron making on the Pacific Coast. Should it prove successful and lead to the development of this most important industry on a large scale, it would prove to be a factor in the development of the Pacific Coast second only in importance to the construction of the trans-continental railroads.

Infra-Red Spectra of the Alkaline Metals.

M. Hans Lehmann, a German physicist, has lately made a series of researches upon the infra-red spectra of the alkaline metals, in which he uses the photographic method with success. He thus designed to complete the former work of Snow and Lewis in this direction. To make the plate especially sensitive to the red rays he uses a solution containing alizarine, nigrosine, ammonia and nitrate of silver, in which an ordinary gelatine plate is immersed. This makes it sensitive to rays as far as 1,000 μ. He has also used the solution proposed by Burbank, containing cyanine, hydrate of chloral and methyl alcohol together with nitrate of silver and ammonia. The plates are developed with oxalate of iron, using a small quantity of bromide of potassium. The luminous source is furnished by an electric arc formed between two rods of the metal to be studied. A screen formed of a concentrated solution of bichromate of potassium in sulphuric acid absorbs all the rays whose wave-length is less than 520 and allows those of greater wave-length to pass. A two-prism spectroscope was used, provided with a total reflection prism and a plane mirror. The photographs thus obtained were examined according to the data previously furnished by Abney, Becquerel, Snow, Lewis, Kayser and Runge. The principal rays of the infra-red spectra of rubidium and cæsium are given as follows:

Rubidium.	Cæsium.
λ = 851.326	λ = 921.186
796.046	917.138
780.598	894.992
775.358	876.610
762.666	852.772
740.619	808.202
729.701	801.962
	761.658
	722.748

AN IMPROVED HAY STACKER AND BUILDERS' DERRICK.

In our issue of April 20, 1901, we described a novel hay stacker patented by Marvin C. Hutchings, of Bozeman, Mont. Mr. Hutchings has since improved his invention with the result that the serviceability of the stacker has been very considerably increased.

As our illustration shows, the derrick is held in place by two guy ropes, the upper ends of which are bifurcated for attachment to the ends of the derrick members. One guy rope is securely attached to the ground; the other is provided at its lower end with a weight, sufficiently heavy to draw the derrick back to its normal position whenever it is inclined. The weight serves to bring the derrick back when the load has been discharged. This weighted guy rope passes over a friction roller which, as shown in Fig. 2, is located in a slot formed in the head portion of an anchorage arm. The anchorage arm is supported by connected legs held to turn in a socket adjustably mounted on the body portion of the anchor arm. By reason of this construction, the anchor arm can be carried to or from the ground in order to give the weight more or less drop. The socket in question is secured to a sleeve, which is held in place by passing a pin through apertures in the arm.

It is frequently desirable to check the movement of the weighted guy rope, and to that end a brake is provided, which is mounted on the bottom of the upper end of the anchorage arm, and which is clearly illustrated in Fig. 2. The brake consists essentially of a plate sliding in guides, which plate is formed with an opening corresponding with the opening in the head of the anchor arm. At the rear end of this

IMPROVED HAY STACKER AND BUILDERS' DERRICK.

opening a brake-tongue is formed, which extends forwardly and is arranged to engage the guy rope passing over the roller. The plate is controlled by a coiled spring secured to the anchor arm, which spring serves to draw the plate to its normal position after it has been carried into engagement with the guy rope. The brake is operated by a cord passed through rings supported by the weighted guy rope. The end of the brake cord terminates in a handle which hangs over the load of hay to be stacked, so that the handle is always in easy reach.

The brake can be brought into action whenever it is required. The main object of this brake is to check the derrick and prevent its tilting to the stack too soon, and thereby delivering the fork to the hay too quickly. The brake can also be used to control the rapidity of the derrick's motion to or from the stack.

The sides of the derrick are extensible and are held in position by wire cables winding on drums, so that the sides can be raised or lowered. The base is adjustable, so that its width can always be made to conform with the height of the derrick.

The invention is not exclusively intended for use as a hay stacker, but is equally serviceable for builders' purposes.

The fiftieth scientific anniversary of M. Berthelot (he began his career as a chemist in 1851) is to be commemorated by the presentation to him of a metal plaquette by his colleagues of the Institute of France. On the front of the plate, which is the work of Chaplin, the engraver, the recipient's portrait will be reproduced in profile, and on the back M. Berthelot will be portrayed seated at his laboratory table, "Truth" illuminating him with a torch, and "Patrie" protecting him under a flag and offering him a crown of laurels.

Correspondence.

A Universal Language.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of December 7 Arcadius Avellanus of Philadelphia says the world should adopt Latin as the universal tongue of cultured people. That no one knows how Latin was pronounced, exactly, is a serious objection. But even laying that aside and pronouncing it some way or other, as the world does, what is the use of learning a language that not a thousand people in the world now speak, when there is already an international language spoken by forty or fifty millions at the very least?

There can never be a universal language. There is a physical reason for it. Give the English language to the Chinese, and come back in a century and you would not know it. The vocal organs are so different in different races that a language will change too greatly for the different races using it to understand each other. Furthermore, people in the North speak so as to keep the cold air in winter from going into their throats. This is especially the case with Russians. This is why the Northman says *hem* (hame) and the "High" or inland German says *heim* (hime). One is in a cold climate and speaks with the lips nearly closed, the other in a mild climate where it is as good a thing to get warm pure air into the mouth as into the house. French comes nearer to being a compromise language for use in cold as well as warm climates than any other language, perhaps because the French are a mixture of the Baltic white and the Mediterranean brunet races. At the same time I learned by dear experience in tie and lumber camps at great altitudes and low temperatures in Wyoming and Utah that it is deadly to open the mouth wide in talking outdoors in winter. I learned that the French stand the worst cold as well as they stand the heat of Algiers. But even their language is affected, and *froid*, cold, instead of being spoken liberally as *frwahd*, ending with the mouth open, is cut to something as short as and nearly like *fret*, spoken with nearly closed lips.

Though the dialect of "Low" or coast German that we call English (from the Engoa or plainsmen of ancient Denmark and other Baltic shores) is my mother tongue, I can read to myself in French faster than in it, and it is in the language, not in me. English as spoken in England and Scotland is so far from our form of it that I understood Germans speaking their own tongue better than I understood the English of England and Scotland. English can never become the universal language; French could as nearly as is possible for any.

It is a pity for a large number of persons to dissipate or expend a vast amount of energy in attempting the impossible—such as a universal language. It would not stay universal, but would break up into dialects recognizable as akin only by keen philologists.

In gathering material for my "Principles of the Science of Money," I found several of the words in commonest use in the tongues of the branches of the Baltic races come from originals on the Babylonian tablets. And if the "Slav theory" of Gesenius is true, perhaps they were received from the north of the Caspian from the blue-eyed blonds in Siberia before they were handed back to their kin in Denmark by Phenician traders. GEORGE WILSON.

Lexington, Mo.

Award of the Nobel Prizes.

The award of the Nobel Science Prizes has just been announced as follows: Physics, Prof. Roentgen, of Munich; chemistry, Prof. Vanthoff, of Berlin; medicine, Dr. Behring, of Marburg, and literature, M. Sully-Prudhomme, of Paris. The recipients will each receive 208,000 francs.

The Nobel prize for the persons who had most benefited humanity during the past year is to be equally divided between M. Dunant, the founder of the Geneva Convention Red Cross Society, who is now very poor, and M. Passy, a French deputy and peace advocate. The announcement of the peace prizes in the Storthing was made the occasion of speeches paying tributes to M. Nobel and exalting peace. M. Lovland, Minister of Public Works, said he hoped the proceedings would encourage the nations and national assemblies to cooperate in promoting peace and arbitration. In the evening Crown Prince Gustav presented the prizes.

The first town in England to effectively display the possibilities of the motor fire engine for fire brigade purposes is Eccles in Lancashire. The engine was constructed by a local firm and has proved a conspicuous success. It carries five men, 300 yards of hose, two standpipes, scaling ladders, jumping sheet, and other necessary apparatus. It is propelled by a 6 horse power electric motor. It is remarkably silent in motion, and averages a speed of 14 to 16 miles per hour on the level. It has also established its ability for climbing stiff gradients with facility.