A NEW FIRE ESCAPE.

The blocks, B, are formed with projections to rest against the side of the building, and in their upper ends have eyes to which are secured chains or ropes attached to hook bolts fastened to the upper part of the window casing or to the floor or wall within the building. Over a roller, A, journaled in these blocks passes an endless belt made long enough to reach to the ground, and strengthened by chains, G, along its edges. The belt and chains are made in sections; the adjacent ends of the belt can be connected by lacing, and the ends of the chains by snap hooks, so that a longer or shorter belt can be formed. The chains pass over chain rollers to prevent the belt from slipping and to allow the descent to be regulated by brakes. To the belt are attached pockets of sufficient size to readily allow people to get in and out of them.

The blocks, B, are slotted, and within the slots are brake wheels, which are secured to the roller shaft and around each of which passes a strap. The end parts of the straps cross each other above the wheel, and are joined to the ends of levers that cross each other at the pivot, L.

The levers work freely in the upper part of the slot. The outer end of a lever of each pair will project into the window, so that it can be reached by people within the room, and the rate of descent controlled. To the outer end of the other lever is fastened a cord which extends down along the endless belt in order that the people in the pockets can regulate their descent. In order to keep the lower part of the endless belt away from the building, it can be passed around a second roller secured to the ground by stakes. When the fire escape is not in use, the belt can be wound around the roller and kept in a box beneath the window.

Our engraving plainly shows the construction and operation of this useful device.

This invention has been patented by Mr. Samuel Norris, of Halifax, Nova Scotia.

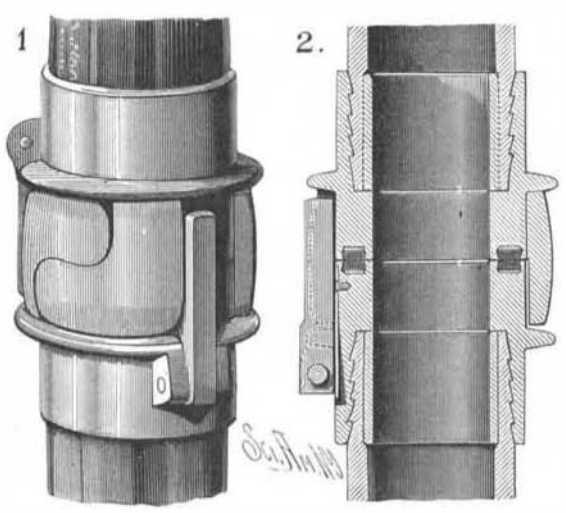
Preparation of Crystallized Aluminum Chloride.

It is an easy matter to prepare a solution of aluminum chloride by dissolving the moist and freshly precipitated hydrate of alumina in hydrochloric acid. Upon attempting to expel the water by evaporation, however, at a certain point it loses its chlorine, which unites with the hydrogen of the water and leaves only alumina (oxide) behind.

According to Gladysz, of Marseilles, the solution can be made to crystallize by evaporating it to 25° or 30° B., and then continuing the concentration in a closed vessel, where the pressure of the atmosphere has been reduced to 500 or 550 millimeters (about 20 or 22 inches of mercury). Here the solution can be evaporated to dryness, or the crystals be separated from the mother liquor in a centrifugal machine. If a concentrated solution of aluminum chloride is saturated with hydrochloric acid (gas?), the pure salt will crystallize out, while ferric chloride and other impurities remain in the mother liquor.—*Neueste Erfahrungen.*

IMPROVED HOSE COUPLING.

A collar or piece of tubing is attached to the end of each hose, and to the outer surface of each collar, upon opposite sides, are secured two hook prongs which project beyond the end of the collar. The hook prongs are all of the same shape, so that their edges will fit very closely against each other. The lower edges of the prongs are formed with a compound curve, so that when locked together they cannot come easily apart. The end of the hose is held between a metal ring and the collar. Each collar is provided with an annular groove in its end edge, into which a metal ring is inserted on which a packing ring of rubber or leather is placed. The object of using the metallic ring is to facilitate the slip that is required in coupling two sections together;



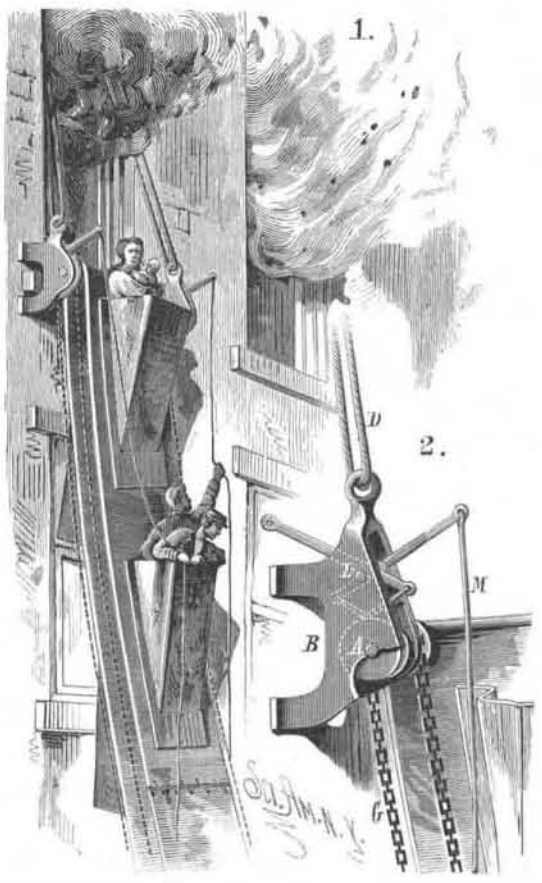
WELLS' IMPROVED HOSE COUPLING.

without these rings this would not easily occur. To prevent all possibility of the sections becoming loosened when once connected, a short bar is pivoted between lugs formed upon the collar in such a position that it will rest in front of the hooked prong when the sections are united. A spring acting upon the rear end of the bar holds it against the joint. This construction makes a joint that is readily operated and that cannot become disconnected accidentally.

Further particulars may be obtained from the inventor, Mr. Thomas E. Wells, of Sandy Hill, N. Y.

Paper Impervious to Grease or Water.

In *Burgoyne's Monthly of Pharmacy* we find the following method described for rendering paper impervious to grease or water. Parchment paper is plunged into a warm solution of concentrated gelatine, to which has been added 2½

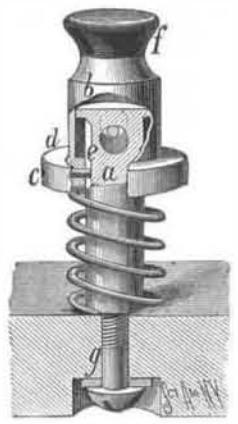


NORRIS' FIRE ESCAPE.

to 3 per cent of glycerine, and allowed to dry. The resulting paper is impervious to grease. If desired to make a paper waterproof, the same parchment paper is taken, dipped in bisulphide of carbon containing 1 per cent of linseed oil and 4 per cent of caoutchouc.—*Les Mondes.*

BINDING POST FOR ELECTRIC CONDUCTORS.

The standard, *a*, is provided at its upper end with an annular flange, and is secured to the base by a screw, *g*, with



GOODBODY'S BINDING POST FOR ELECTRIC CONDUCTORS.

which the conducting wire is connected. On the standard is a loosely held cap, *b*, which is pressed upward by a spiral spring, and which is furnished with a head, *f*, of insulating material. The cap is prevented from turning by a pin, *c*, passing through the flange on its lower end, and entering a longitudinal groove, *e*, in the standard. The flange on the top of the standard prevents the spring from raising the cap too far. Through two holes placed diametrically opposite in the cap and through a hole in the standard (the holes being brought in line by pressing the cap down) is passed a pin secured to the conductor.

The upward pressure of the spring insures the pin being held firmly. The post is especially designed for use in medical batteries and also for ordinary electrical purposes. The insulated top enables the physician or electrician to change the current with great facility while treating the patient, and without diverting the current in any way from the patient.

This invention has been patented by Mr. A. G. Goodbody, of Louisville, Ky.

Steam Launches for the Arctic Regions.

The two launches for the Greely expedition are whale boat shaped and are built very strongly of oak frames, double cedar planking and copper fastened throughout, with a Herreshoff condensing engine and improved safety boiler. They are 28 feet in length, 7 feet 8 inches beam, and have a draught of 3½ feet. The shaft is fitted with a knuckle joint, so that the wheel can be hoisted out of water in case of ice or when sail is used. They are also fitted with three keels, which will act as sled runners when being hauled over the ice.

To Prevent Air Bubbles in Cast Iron.

It frequently happens, says the *Polytechnisches Notizblatt*, that in working castings porous places are found beneath the surface, which render the casting useless. On examining the cavity closely, a little smooth and hard bullet will be found within it. Simple air bubbles can be produced as foam is in melting the metal; but these little bullets indicate that little particles of the metal have been broken or thrown off, and this could only happen while pouring it into the mould. The mould generally consists of a double box (flask) filled with sand. In pouring in the metal from above, it spurts when it comes in contact with the bottom, just like any other liquid; that is, little particles break off, and forming pellets or balls harden in the air. This cooled and solidified iron floats on the surface of the melted iron, and the air that it carries with it forms bubbles, which also harden on the surface, as it is very thin, and hence these bullets and bubbles frequently collect in nests, which are either on the surface or in the corners, and are not melted again by the rest of the fused metal.

The metal that falls perpendicularly frequently tears loose single particles of sand from the mould, and this sand floating on the metal forms cavities wherever it rests, and doubly spoils the casting.

According to the *Techniker*, all this can be avoided if the funnel or pouring-in hole is arranged at an angle of 30° to 45°, and in such a manner that the metal shall enter the mould from beneath if possible. With such a pouring-in place the metal will enter the mould without spurting, and if care is taken to furnish a suitable escape for the air it will fill out the form beautifully. The only disadvantage of this arrangement is that it would require a larger flask, and for most patterns even this can be avoided by skill in placing the pattern and funnel.

Glass Manufacturing in Europe.

Each of the various countries on the Continent where glass is manufactured produces an article peculiar to itself and unlike its neighbors; and one of the specialties of Austrian glass making is the manufacture of various fabrics for ladies' wear from spun glass. The glass is spun into threads, like ordinary silk or cotton, and woven into different colored fabrics, sometimes entirely of glass, and sometimes with a warp of silk or cotton. Collars, neckties, cords and tassels, fringes, pin cushions, feathers, belts, etc., are all made of this material. At the Paris Exposition in 1878 a bonnet made entirely of spun glass, with feather and ribbons, lined with silk, was shown, as well as cloaks and other articles of wear. This spun glass is also used for watch chains, brushes, etc. Glass flowers are also made to a considerable extent, but it is difficult for these to compete with those made from china.

NEW RECLINING CHAIR.

The side bars of the back are pivoted to the outside of the arms—thus making a wide and comfortable back—and below the arms they are bent inwardly and extended downwardly inside of the legs. The lower ends of the bars are connected by rods to the foot rest frame that is pivoted to the arms near their front ends. The seat frame is pivoted to the foot rest frame and also to the side bars of the back. This makes a contrivance of parallel bar connections between the foot rest and back, allowing the person occupying the chair to swing the back to suit his pleasure by simply moving his body backward or forward. One end of a flat bar, having its surfaces serrated so as to prevent it from slipping on the

DEPPEN'S NEW RECLINING CHAIR.

bars, is placed under the lower cross bar of the back and over a front cross bar, by which the weight of one or both of the legs will hold the seat and back when set; the removal of the weight will relieve the back so that it can be shifted. This bar can be readily adjusted lengthwise so as to bring the rest to any desired position, and can also be adjusted laterally. Our engraving shows a side elevation and a perspective view of this comfortable and durable chair.

This invention has been patented by Mr. Isaac Deppen, of Scranton, Pa.

Observations on Hardening.

Too many of the so-called steel articles sold in the market are either made from steel incapable of being hardened, or are not hardened at all. Good cast steel can be hardened and tempered so as to receive and retain an edge. This is not required of table cutlery generally—only of the carving knife—but it is required of the hand saw and the buck saw, of the spade and the manure fork, of the scissors and the pocket knife. Saw blades (so far as the writer has tried them) are not hardened; they will not retain "set" nor hold edge. They are gummed, as they come from the rolls and the slitting machine, with no pretense at hardening or tempering. But they are stamped "cast steel," and that probably satisfies the public; but there are mechanics who would pay something extra to get good hardened and tempered saw blades, even at a much higher cost than that of the soft plates, the teeth of which can be bent by thumb and finger, and the set of which is removed by sawing through an inch thick spruce board.

A spade is only an enlarged chisel; it should be capable of retaining an edge sufficient to cut through tough turf and dead grass. But most of the "cast steel" spades in the market can be sharpened as readily by drawing the edge cold under the hammer as by the grindstone. The edge never breaks, but batters and bends.

The trouble with almost all the cast steel tools put ready made on the market is, that they have never been hardened. Cast steel unhardened is as soft as wrought iron uncasehardened. A cast steel hammer became so indented on its face by driving nails during one season in jobbing that it had to be reground and polished. Yet the hammer was of steel capable of being hardened, as was proved by its being subsequently hardened and drawn to temper. It is quite possible that the reason why many of these articles prove to be soft is not that the material is not good, but that they have never been hardened. Brightened steel that has not received a hardening may respond in after-heating to several of the tempering colors, and this is probably one reason why common steel articles are not thoroughly hardened.

It is not uncommon to see a forger or temperer heat a piece of cast steel to a very low red—a red that shows only in the shadow—and then brighten and draw the temper to color, when the after-trial proved that the steel had never been hardened. Indeed, the dull red that some smiths use for hardening such tools as cold chisels and other low grade tools is that at which a red annealing may take place—the piece being heated to a dull red and plunged into water.

The first requisite in making a cast steel tool into a working tool is to harden it. After its hardness is proved, then it may be tempered to the condition required. There is no intermediate process of properly tempering between absolute hardening and subsequent drawing.

The Lead Bath.

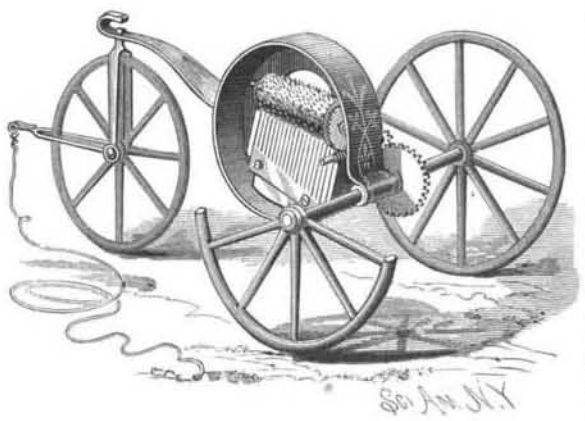
Users of the lead bath for heating for hardening make frequent mistakes in allowing something besides lead to form a portion of the bath, and also in allowing the bath to be kept below its proper temperature. Only pure lead should be used to obtain the full heat for hardening good tool steel. A mixture of lead and tin—a melted mass composed of pewter, type metal, and soft solder—is not a lead bath. The melting and heat holding qualities of metals are not alike. With clean, pure lead, either pig or bar, good cast steel can be heated to its proper intensity to obtain a good hardening, and then be drawn to color in sand or blazed in oil. But the lead must be kept at a limpid fluid heat, hot enough to make its covering of charcoal powder glow, else the steel will not receive sufficient heat to harden.

Anti-Induction Telephone Circuit.

Recent and very satisfactory trials have, we understand, been made by the National Telephone Company on their trunk line between Greenock and Glasgow, of a telephone circuit devised by Mr. Smillie. The telephone instruments at each end are each connected in circuit with a flat circular coil of wire, without a core, and the earth. These coils are confronted by equal and parallel coils of wire, also without cores, and in circuit with the main line wire and a loop line, thus forming a continuous going and coming circuit. The message is induced into the line by these coils, which, not having soft iron cores, exercise little retarding influence on the currents

MUSICAL WAGON.

Our illustration represents a musical wagon of novel construction recently patented by Mr. Hiram J. D. Miner, of Dunkirk, N. Y. Mounted in any suitable way upon an approved kind of wagon is the case of a musical instrument consisting of a pin barrel and comb, the former being provided with the usual toothed wheel and worm for turning it. But instead of being geared with the train of a driving spring, the worm is geared with the axle of the main wheels of the wagon by a pinion and wheel, so that, when the wagon



MINER'S MUSICAL WAGON.

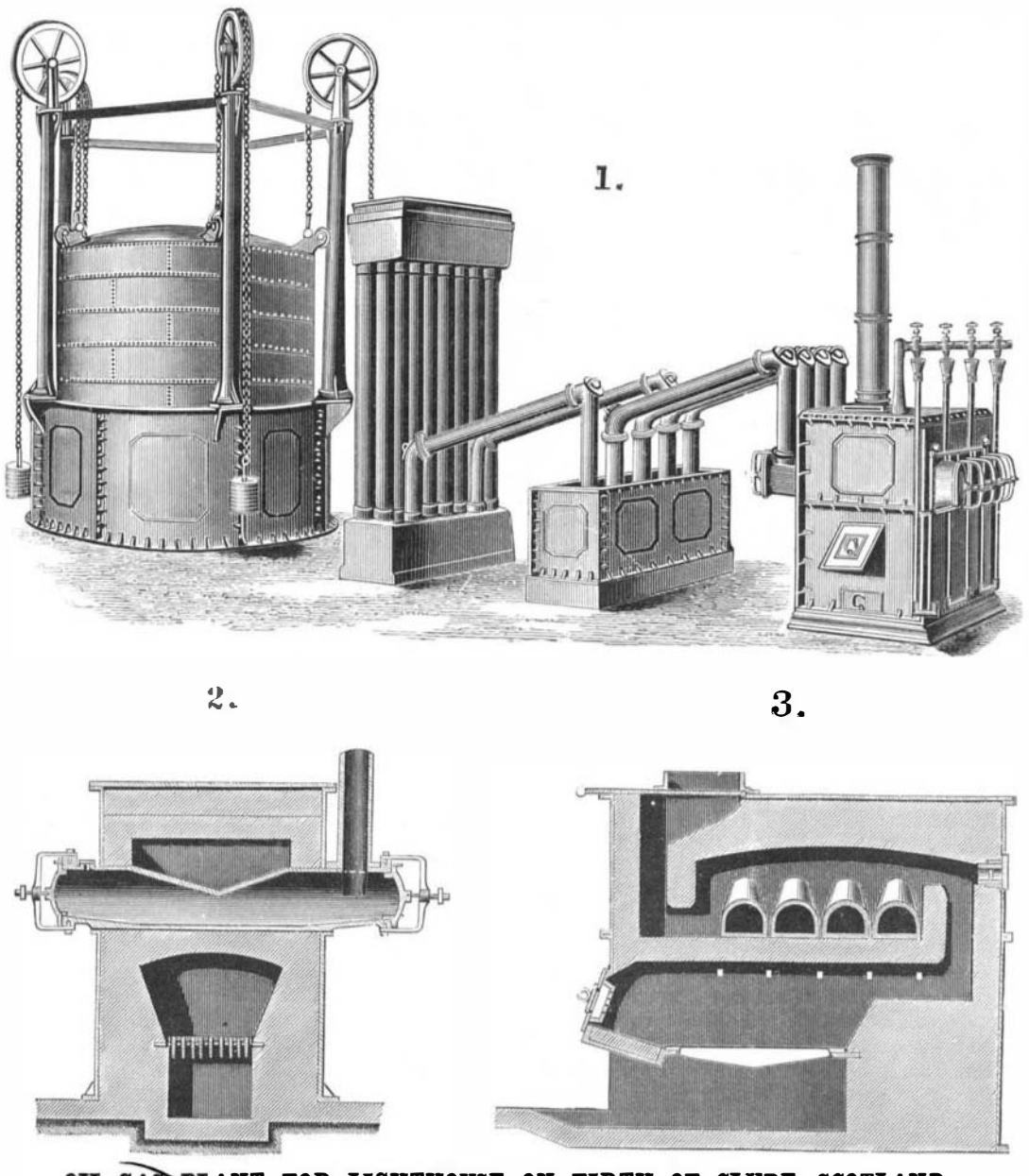
is drawn along, the barrel will be revolved and music made the same as if the barrel were driven in the ordinary way. The driving wheel and pinion can be readily taken off, to substitute others of different proportions, for varying the time of motion to render the music in quick or slow time as may be desired.

Wood Preserving Works at Las Vegas, N. M.

A Las Vegas exchange reports that the Atchison, Topeka & Santa Fe Company have executed a contract for the erection at Las Vegas of very extensive wood preserving works. They are to use the Line-Tonnier chemical process, which is owned and operated by the St. Louis Wood Preserving Company. This process was awarded the "gold medal" at the National Exposition of Railway Appliances, held at Chicago last June, as the best process for preserving wood, cross ties, and timber. This company has been using the New Mexican pine, but until treated, it is not particularly lasting. After being subjected to this chemical process, it is said to be very superior timber. This industry, when generally adopted throughout New Mexico, will prove one of importance.

OIL GAS PLANT FOR AILSA CRAIG LIGHTHOUSE.

A considerable time ago the Commissioners of Northern Lighthouses, on the recommendation of their engineers, Messrs. D. and T. Stephenson, decided to proceed with a scheme of erecting a new lighthouse on Ailsa Craig, an immense rock lying in the channel at the entrance to the Firth of Clyde; and as there was ample space on the islet for the fitting up of gasworks, they arranged to have the great lantern lit by gas. To provide against the obscurity of the light during the dense fogs which hang over the Firth during the winter season, the Commissioners determined also to fit up a large foghorn, to be operated by compressed air, the air being compressed by means of a number of gas engines. The works contemplated being of unusual magnitude, the Commissioners submitted the scheme to the most prominent oil gas engineers throughout the country, and asked for plans and estimates for carrying out the work. After a long delay, during which trials of various kinds of apparatus have been made, the Commissioners have at length definitely adopted the plans furnished by Mr. James Keith, gas engineer, of London, Edinburgh, and Arbroath, whose apparatus has already been used for similar purposes at Langness Point, in the Isle of Man, by the Northern Lighthouse Board. At Langness the oil gas plant was laid down merely to provide gas for a pair of Otto gas engines which operate the foghorn, but at Ailsa Craig the works are on a much larger scale, and provide for the supply of gas to the great lantern in the lighthouse tower, as well as to no less than 8 Otto gas engines of 8 horse power each. The works on Ailsa Craig will comprise a commodious gas house, in which will be erected three of Keith's patent oil gas producers and washers, with four retorts in each producer. There will thus be in all 12 retorts, capable of producing in the aggregate 2,000 cubic feet of gas per hour. The retorts are of simple construction, and are so arranged that the necessary heat can be raised within two to three hours, and the manufacture of gas be thereafter continuously carried on at the rate mentioned during the longest fogs. A short distance from the gashouse will be placed two gas holders, with cast iron water tanks, columns, and mountings of an exceptionally substantial character, to withstand the furious gales to which the rock is exposed. Each gas holder will contain 10,000 cubic feet, the two holders thus providing between them a store of 20,000 cubic feet of rich oil gas. The gas holders are connected to the producers in the gashouse through 12 of Keith's patent oil gas coolers placed outside, the gas produced from the oil being extremely pure; the scrubbing apparatus is of the simplest kind, and no purifiers are required. The material employed for the generation of the gas is a partially refined shale oil, technically known as blue paraffine oil, which has the advantage of being inexplosive, and of being obtainable in any quantity at a very cheap rate, ranging, according to quality, from sixpence to ninepence per gallon. The oil produces a rich 50 candle standard gas, which is reduced, according to a method adopted by Mr. Keith, before it is consumed, by admixture with about half its volume of air by means of a meter mixer, so that the total quantity of stored gas available—of a quality equal to good Scotch standard coal gas—is 30,000 cubic feet. The meter mixer automatically and accurately measures the proper quantity of air, which it thoroughly mixes with the gas, as the gas passes through the meter, and as it is being consumed. This reduction of the quality of the gas admits of the ordinary form of gas burners being used. The cost of the gas consumed on the rock will not exceed 5s. per 1,000 cubic feet, and the gas itself—though undergoing no purification by lime, etc.—will be much purer and brighter than the best Scotch coal gas.



OIL GAS PLANT FOR LIGHTHOUSE ON FIRTH OF CLYDE, SCOTLAND.

The gasworks, says the *Mechanical World and Steam Users' Journal*, will be situated at a considerable distance from the new lighthouse and engine house, as well as the light keepers' dwelling houses. In the engine house, in connection with the fog signaling apparatus, will be placed the gas engines, so that they may be ready to start at a moment's notice at any time during the day or night, to sound the roaring fog horn, should a fog suddenly come on and obscure the light in the lighthouse tower overhead. The engines, as we have mentioned, are eight in number and are each of 8 horse power, the engines selected being of the Otto silent type. In ordinary circum-