the Oregon's officers, that the strange sail was stand-in the process of handling or raising them from a safety and convenience of communication of the east, the west by north wind would have been dead was accompanied by waterproof ink. astern for her; the most natural position for her sails, wing and wing; and her course exactly parallel with mon acceptation of the term, and, if there could be certhat made by the Oregon, though in the contrary di- tainty that they would remain so, nothing more would rection. To say that a sailing vessel bound east, with be needed to protect documents or anything else perthe wind dead aft, was on the port tack, and heading mitted in mail bags; but as holes are likely to be worn N.N.E., would imply that her skipper had lost his or torn in them, the only final resource is in the prosenses.

If, on the other hand, the stranger was bound into; action of sea water. New York, but instead of being at anchor, as suggested above, was really beating down the coast against wind ink which will meet this requirement can be furnished and tide, she would seem, according to the position of at reasonable cost, they would at once find a ready the injury to the Oregon, to have been close-hauled on market throughout the civilized world, provided cer-Harrison in a recent number of the Photographic News the starboard tack. She could not pay off her course tain other requirements are at the same time complied without running into the steamer. All that was left with. her was to come up into the wind and go about on the other tack. Having the right of way, and time being short, she did neither, and the steamer, when too late, action of sea water indefinitely, and this can, of course, ported her helm to avoid running over her, and as a result struck her a glancing blow.

#### PRACTICAL DIRECTIONS FOR LIGHTNING RODS.

As the season of thunder storms is not far distant, a few practical directions for lightning rods may be transatlantic correspondence. The materials required The small quantity of ammonia appears to act as a found useful.

rods are better than one, each rod to be continuous, or if jointed, the joints to be soldered.

Run the upper end of rod around the edges of the chimney, and thepeaks and edges of the roof; bend so from showing through. As for economy in foreign as to leave a looped point at each corner; points to be mails, it is essential that paper should permit writing 6 inches high. Fasten the rod directly to the exterior of building with staples, no insulators. The bottom of each rod should be wound around the metallic street water pipe (or gas pipe, if there is no water pipe). Better solder the rod to the pipe.

By means of branch wires or rods connect the lower ends of the water leaders, also one end of each metallic gutter, also all metals and metallic roofing, if any, with the rod; solder the connections, and run rod to ground and around the water pipe, as before stated. Several separate rods may be used. The months ago to the waterworks at Buffalo, N.Y. It more the better, if properly grounded.

connected with the earth. For this reason soldering to the underground water pipe is advised.

dig a very narrow trench four feet deep, cone-shaped bottom, and fill into bottom a continuous layer of coal per cent. Though now idle, awaiting the extension of dust and lay the rod therein. Any kind of coal dust, charcoal, hard or soft coal will do. The trench with coal dust layer and rod therein should be say 100 feet portion of the city being at present but imperfectly long. Coal is an electrical conductor. The object of supplied by the reservoirs. placing the lower end of the rod therein and extending the rod so far is to secure good ground conduction and connection for the rod.

in their ground connections, and consequently are tributes an interesting paper to the Transactions of the practically useless. This is the reason we hear of so British Institution of Civil Engineers, descriptive of many instances of damage, even when buildings have the methods of construction and operation of locomo rods. In general, the rod is simply stuck down two tive engines in that department. (Paper No. 2,081.) or three feet deep into dry earth, which is about the same as if the lower end of the rod were inclosed in tween Naples and Portici. In 1859 railways were opened a bottle; such rods are fatally defective. Now is the in Parma and the Papal States. There are to-day 320 time to look to your rods. Correct the main defect, miles (15,000 kilometers) of road built, under construcby making a first rate ground connection, as above tion, or authorized, about two-thirds of which are in described, or take down your rod. The only chance operation. The engines are usually of English confor safety is with a good ground connection. The struction. Some of the more recent locomotives are risk of damage is less without a rod than with one from French, German, and Austrian establishments. badly connected to the earth.

# WATERPROOF WRITING INK AND PAPER.

Oregon and her cargo calls attention to some much needed inventions.

the bulk went down with the ship. A considerable sure of 25 atmospheres, receive the ferrule without

ing inshore on the port tack, with the wind over her wrecked vessel they are liable to be rendered leaky, American design and the privacy in each compartment port quarter, is untenable. For, if she were bound and waterproof paper would be of no service unless it enjoyed in the Continental system. In case of trouble,

> The mail bags need only be waterproof in the comduction of paper and ink that will resist the prolonged

> There can be no doubt, we think, that if paper and

Waterproof paper and waterproof ink already exist. What is known as parchment paper will withstand the be written upon by certain carbon inks in market con- I have made many slides with this soda ammonia develtaining materials that, once dried, are thereafter practically insoluble. But that these do not meet the fully steady and uniform manner in which the image wants of the public for writing materials is proved by is built up allows full density to be obtained and dethe fact that they are not universally employed for velopment to be stopped at exactly the right time. must not only resist the action of sea water. that is to Quarter inch naked copper wire, such as is used for say, the sodium chloride, iodine, and bromine held in ries on and completes the work. street electric lights, will do for the rods. Two of such solution, but they must be nearly or quite as convenient to use as ordinary paper and ink.

> The paper should be light, flexible; and opaque, to economize postage; fold easily, and prevent writing upon and copying from both sides.

The problem is both mechanical and chemical in its nature, and the resources of modern chemistry and mechanics should be, we have no doubt are, equal to its solution. Any seeming incompatibility in the requirements named will probably vanish in a careful study of these resources.

### The Gaskill Engine,

A new Gaskill pumping engine was added some dow or a large body of water. has since been subjected to a three months' test, prior The essential rule of safety is to have the rods well to its formal acceptance by the water commissioners. This probationary period ended on the first of March. The performance of the engine during these months If no metallic water pipes or gas pipes exist, then has been very gratifying. It indicates a marked fuel economy, exceeding the guaranteed duty by about 11 the street mains, it will probably eventually be utilized for direct pumping, according to the Holly system, a

### Railway Practice in Italy.

Mr. S. Fadda, the Chief of the Department for Pre-The great majority of rods now erected are deficient liminary Studies of Rolling Stock in Upper Italy, con-

> The first line was built in that country in 1838, be-Many of the gradients are very heavy, necessitating heavy engines.

The shells of the boilers, curiously enough, are of An incident connected, with the loss of the steamer iron, the law forbidding the use of steel or of "homoge-bregon and her cargo calls attention to some much neous iron." The fireboxes are of copper, though steel has been tried unsuccessfully. The tubes are of drawn A portion of her mail was saved before she and, but brass-70 copper, 30 zinc. They must bear a test p

it becomes easy to notify the guard, and to secure his presence and aid.

Italy is still far behind the other countries of Europe, generally, in all that relates to the useful arts, and the introduction and maintenance of manufactures seem to find but little encouragement or success. The writer of this paper hopes to see a change in this respect in the future, but evidently finds no great evidence of progress at present.

## PHOTOGRAPHIC NOTES.

A Soda and Ammonia Developer.-Mr. W. Jerome speaks of using the following developer with consider able success in the development of lantern slides and negatives. He uses the pyrogallic acid in solution with citric acid and sulphite of soda, termed sulpho-pyrogallol, essentially a 10 per cent solution of pyro. He says: oper, and without a single failure; while the wonder-"whip," starting development, and the soda then car-

With the use of sulpho-pyrogallol the development may be prolonged without staining the film.

The normal developer is:

| Water                            | 1 ounce.    |
|----------------------------------|-------------|
| Руго                             | 2 grains.   |
| N. H. 4 Br                       |             |
| Carbonate of soda (washing soda) | 100 grains. |
| Ammonia                          | 1 minim.    |

The ammonia used is in the form of a 10 per cent solution.

Use of the Polariscope in Photographic Lenses.-In the Br. Jour. of Photo. Mr. J. Vincent Elsden speaks of the advantage which the polariscope has, when inserted between the lenses, of preventing the injurious effect on a plate of the strong reflection and glare which sometimes occurs when the lens points toward a win-

He took a small Nicol's prism from a microscope, out of its brass mounting ring, and fitted it into a cork rim: he then inserted it between the two lenses of a rapid symmetrical, so as to occupy the position usually taken by the diaphragm.

Owing to the small size of the prism, it acts as the diaphragm itself.

The exposure in comparison with the use of the smallest stop had to be twice as long.

By the use of the prism he was able to obtain a little more detail in certain parts of the picture, where there had been a strong reflection. Photographers have often to deal with awkward cases of reflection from shining surfaces, such as tombstones, oil paintings in a room, sheets of water, and similar things, and the ease with which a polariscope can be fitted to a lens suggests the advisability of at least trying its effect in diminishing the glare, especially as but little harm can result, except an increase in the length of the exposure.

#### ----Scranton Bessemer Steel Work.

The Scranton Steel Company, of Scranton, Pa., reports the following figures as the result of its December work:

| Number of 12 hour turns worked   | . 25    |
|----------------------------------|---------|
| Number of heats made             | . 1631  |
| Total tonnage (gross)            | . 72:20 |
| Average tonnage per turn (gross) | .288.80 |
| Average number of heats per turn | . 65 24 |
| Average tonnage per heat (gross) | 4 • 43  |
|                                  |         |

The number of heats per turn, 65.24, is very remarkable, and is due to the small size and convenient arrangement of the vessel plant.

#### -----Freight Cars Drawn by Electricity.

Mr. John C. Henry, of the Henry Electric Railway Company, Kansas City, Mo., writes us as follows:

portion of this mail is reported to be of great value, cracking, bear bending to a curve of 20 in length and "On January 29 I hitched our electric car Pacicontaining securities, coupons, etc., amounting, as has versed shie of 2% in, without injury, and must be and instit to a K. U. F. S. & (f. coal car, weigning 17,000 been estimated, to over a half a million of dollars, be- form and true to gauge. Iron tubes in adjacent parts pounds, and took it up a 2½ per cent grade. Yestersides drafts, letters of credit, etc., the value of which of Europe have been given up and replaced by brass. day I coupled the same motor car to C., B. & Q. box All wheels, as well as axles, are of wrought iron. The is unknown car 19,178, weight 24,500 pounds, and started it without A wrecking company employed to inspect the wreck, tires are of crucible steel or of Bessemer or Siemens tin jerking, on a 3 per cent grade. I claim the distinction and report upon the possibility of recovering the ship metal. The frames are wrought iron, the cylinders of of being the first to haul regular standard gauge freight and the cargo, reported that the cargo and mail might cast iron, the slide valves of gun metal, often, the rods of cars by electricity, and would be pleased to have you record it." probably be got out of the steamer, and the reconnoi- crucible steel. During late years, the number of engines placed on the principal lines has exceeded those tering steamer also picked up some floating mail bags and brought them to New York, where their contents Zinc. so added in England. L. L'Hote in Comptes Rendus says: As to the inquiry The carriages are usually of the English type, but were dried previous to forwarding them to their ultimate destination. Much of this mail matter was, of sometimes of the American form. An intermediate or if zinc free from any foreign metals decomposes water course, badly damaged by wetting, and more serious composite type has of late been adopted, as suggested either on boiling or in presence of dilute sulphuric acid, experiment proves that such is not the case. injury is to be expected in that which, at the bottom by the late Heusinger von Waldegg, in which a passage is provided at one side the line of compartments, Pure zinc heated with distilled water in a flask, so arof the sea, must be subjected to long soaking prior to ranged as to receive the gases over mercury, gives off its recovery, if ever recovered. along which the guards can traverse the carriage and Now, to secure a mail, as far as possible, from injust the train from end to end, the communication between no hydrogen on prolonged boiling, nor is it attacked by by submergence in salt or fresh bodies of water there carriages being effected by the use of platforms at the dilute sulphuric acid. The presence of iron in propormust be waterproof mail bags, waterproof paper, and ends, as in American cars. This removes one of the tions of from 3 to 5 in 100,000 enables it to decompose great dangers and inconveniences attendant upon the water. Traces of arsenic and antimony have the same waterproof ink. Waterproof mail bags will not alone be sufficient, as use of the English style of carriage, and gives both the effect.