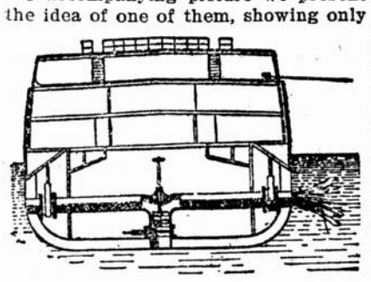
POPULAR SCIENCE

Protection for Battleships.

One of the subjects over which there was considerable controversy during and after the close of the Spanish-American war was the inability of our battleships to coal in the open sea, owing to the roughness of the water and consequent liability of collision between the rocking boats. As this difficulty is more than likely to occur again, and possibly with more serious consequences than in the past, the inventors have already taken up the task of surmounting the trouble. In the accompanying picture we present the idea of one of them, showing only



Keeps Ships Apart While Coaling.

the outline of the hull, but illustrating the manner of mounting the apparatus. As it is almost impossible to keep the vessels apart with any rigid connection, it is the intention of this inventor to use streams of water as a fender, creating a current of sufficient strength to hold the ships as far apart as the connecting ropes will permit. As will be seen, the water is taken up through the bottom of the hull and discharged at the side, the apparatus only being used during the operation of coaling, while the propelling machinery is at a standstill thus requiring no increase in the steam plant of the vessel.

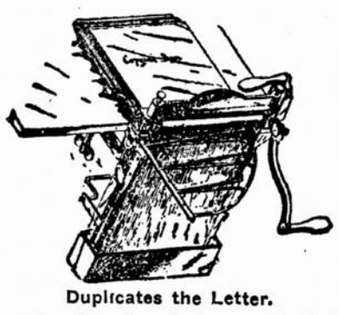
Gas and Electric Light.

Commenting on the report of the gas and electric light commissioners of Massachusetts for the year ending June 30, 1902—in which the deaths caused by gas and electricity are gaven as 79, and accidents that did not terminate fatally from the use of gas as 106; the deaths from electricity being 14, and accidents not fatal being 11—the Electrical Review says: "It is to be regretted that since no estimate is given of the number of persons using gas and electricity, these figures cannot be compared, and therefore they do not represent in any way the relative dangers arising from the use of either gas or electricity. It should be noted that the greater number of deaths from electricity were those of men working for the companies, or persons intentionally touching live circuits, while the deaths from gas were due, in most cases, to carelessness in shutting off the supply. It would seem that gas is more dangerous to the consumer than electricity, and that electricity is more dangerous to the employes of the generating company than to its patrons. Although there were 16 suicides from gas, no case is reported of attempted suicide by electricity."

New Letter Copying Press.

For some years past the copying press has played an important part in all business systems where attention is paid to accuracy and detail, sometimes merely as a matter of convenience in keeping records of correspondence, but frequently serving the more important work of verifying orders for goods or showing prices quoted to customers. With the old fashioned screw press it is no light task to make copies of a large number of letters or bills, considerable time and strength being required to do the work satisfactorily.

In the accompanying drawing is shown an innovation in this line which is designed to lessen the exertion and time necessary to duplicate the stenographer's work for future reference. This machine has an endless moistening belt, which is immersed in a



Duplicates the Letter.

trough of water during part of its revolution.

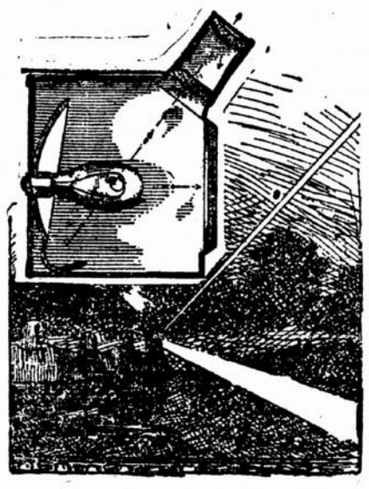
The book in which the letters are to be copied is folded with the leaves outward and placed with its back adjacent to the press. By turning a lever one end of the pressure roller is released and elevated to permit a sheet from the book to be laid on the wire rack and be covered by a letter. Then the roller is clamped in position again, and a turn of the crank toward the right passes the page and letter between the two rollers, the former being moistened by the endless belt and falling into a vertical position while the letter falls on the book and is removed by the operator. Then a fresh page from the book and a new letter are laid on the rack and the operation is repeated.

Defects of the Steam Engine.

To exhibit the ineffectiveness of the steam engine an English journal publishes a drawing of the machine marking it with figures at different points to show where the available energy of the fuel is employed or wasted. The weight of the coal used for fuel is taken as 100, and of these 100 units only eight are available for useful work. Twenty-two units escape through the smokestack as gas and smoke; five units are wasted by radiation from the boiler; one unit drops out with the ashes below the firebox; twelve units are employed for pumping a fresh supply of water to the boiler; fifty-one units are lost in escaping steam, and one by radiation from different parts of the appartus. Evidently the steam engine is a poor affair; but it has served the world well.

Improved Locomotive Headlight.

While all the great trunk lines of railway are now provided with at least two tracks, and some with four tracks, over which to handle their traffic, there are yet many miles of single track railway in the country and head-on collisions are still liable to happen. It is especially to guard against accidents of this class in the night that the improved headlight illustrated in the picture has been designed by a Georgia inventor. Two views are shown, one of the light in actual use, and the other showing its construction and the manner of mounting the lenses. In addition to the horizontal beam of light which an ordinary headlight throws down the track, a double lens is mounted in a tube above the bull's eye, carrying a portion of the rays of light aloft in an oblique direction, and making them visible to the engineer or fireman of a train approaching from the opposite direction. With this attachment on an engine its approach may be noticed several miles away, even though hills and curves in the road intervene, as the beam of light extends high enough into the air to be readily discernible long before the locomotive itself comes into view. The inventor has



Throws a Signal Beam in the Air.

also introduced a cut-off mechanism, with which he proposes to have the trainmen signal each other, in accordance with a predetermined code.

A Unique Variable Star.

Messrs. Mueller and Kempf have discovered in the course of their photometric work at Potsdam a variable star of so short a period—about four hours—that it may fairly be called unique. Up to this time, the variables that went through a complete cycle of changes in the shortest time were two stars in the star cluster Omega Centauri. These bodies complete their periods in 7 hours 11 minutes and in 7 hours 43 minutes respectively. S Antlioe has a period of 7 hours 47 minutes. The Potsdam star has a period about one-half as long. From minimum to maximum the light changes at a slower rate than from maximum to minimum. The magnitude varies from 8 6-10 to 7 9-10 and the length of the period is 4 hours 13 seconds. The hypothesis that best explains the observed phenomena is that two bright bodies are revolving at a small distance about their common center of gravity, the plane of revolution being nearly in the line of sight.

Weighing a Perfume.

An Italian physicist, Signor Salvioni, has devised a microbalance of such extreme delicacy that it clearly demonstrates the loss of weight of musk by volatilization. Thus the invisible perfume floating off in the air is indirectly weighed. The essential part of the apparatus is a very thin thread of glass, fixed at one end and extended horizontally. The microscopic objects to be weighed are placed upon the glass thread near its free end, and the amount of flexure produced is observed with a microscope magnifying 100 diameters. A mote weighing one-thousandth of a milligram perceptibly bends the thread.

Making of Mineral Wool.

Mineral wool, which is used for packing around boilers, furnaces, and pipes to retain heat, to deaden walls, and to keep out cold, is made from furnace slag by blowing air through it while molten.

Progress of Invention.

Microphones are now made so sensitive that by their use one may hear the groans of a dying fly.

The secret of making carbon paper and typewriter ribbons is known to scarcely two dozen people.

Wireless telegraphy gives worse results on land than at sea. A coherer placed underground is not influenced by electric waves, which proves that the curvature of the earth constitutes an absolute barrier to wireless telegraphy.

Successful experiments have been made in generating electricity to light railway trains by placing a fan on the front end of the locomotive. The pressure of the air revolves the fan and produces the power.

Twelve Hours of Activity With Andrew Carnegie

A Day with the Great Philanthropist in His Beautiful New York Home—Perfect System in Each Hour of Labor.

Nine! The deep-toned bell of the cathedral clock in Andrew Carnegie's mansion at Fifth avenue and Ninety-first street, New York, has chimed the quarters in a musical scale, and is booming the hour as the master reaches the doorway of his workshop.

As he stands for a moment on the threshold of his library, his small, lithe figure is the incarnation of quiet force and nervous energy. He has said publicly that he is out of business for good. He is about to begin a busy day, in the course of which he will accomplish twice as much work as many a man in the hurly-burly of lower Broadway who is still in active command of his forces as a captain of industry.

System is Andrew Carnegie's watchword. Although no longer directing the movements of 200,000 employes in the great steel works and other enterprises with which his name was so long associated, he continues to be the man of affairs, and each day brings its labors, none the less exacting because they are primarily for the good of humanity and not for personal gain.

It is estimated that Mr. Carnegie's income is $15,000,000 a year. Of this he gives away two-thirds at least. Exactly how much of his fortune is dispensed in public and private gifts no one knows but himself. To distribute money so that the greatest good to the greatest number shall result is the business of his life, and he devotes at least ten hours a day to this task with all the vigor and concentrated shrewdness which have made the former peasant boy of Dunfermline one of the wealthiest men in the world.

Ah, the morning papers! To read some of them and look through the rest is the first thing to be done. Mr. Carnegie is a rapid reader, and as his interest extends to all parts of the world, it is well that he is, for he reads everything in the paper, from the foreign cable dispatches to a skimming over the advertisements.

The papers disposed of, he rings for his secretary, James Bertram, a Scot, like his employer; quick-witted, too, or he never would do for Andrew Carnegie.

"What's new, Bertram?" he asks, pleasantly, as he picks up one of the pile of letters which have been placed at his elbow, open and ready to be scanned.

"Nothing particular. You will find several organ requests in that pile which look all right, and there is an answer from that Indiana town about their library. There are two personal letters for you, too. Oh, yes, you have them."

This with Scottish directness and military brevity, as Mr. Carnegie breaks the seal of one of the two letters, which have been placed on his table unopened. Very few are the letters addressed to Andrew Carnegie that are not opened by Bertram, who, with the true private secretary instinct, seems to be able to smell a missive that is personal enough to belong only to the person whose name is in the superscription. Among these are letters from relatives, of course, and a very few from other persons whose relations with Andrew Carnegie are intimate. To prevent any misconception, let it be said here, positively, that writing the word "Personal" on an envelope will not deter the secretary from opening it.

Mr. Carnegie has gone through the first letter and makes a short memorandum on it. The same with several others. Then he takes up one from a Western city which tells him that the authorities there have decided not to accept his offer of a library because public feeling is against using the required sum from the municipal treasury every year to support it. He elevates his eyebrows in a shadow of vexation, and dictates a reply to Bertram, who jots it down in shorthand. The reply is courteous. It expresses regret that the town will not take a library on the terms offered, but declares emphatically that the conditions which govern all other library endowments cannot be modified in this case.

By the time the correspondence is disposed of, and Mr. Bertram's notebook is full of pothooks for Campbell to turn into typewritten letters, the forenoon is well advanced, and a pile of newspapers from other cities, in America, and abroad, are ready for Mr. Carnegie's attention. He reads the mail. Many are complimentary, but there are some which criticise the use he makes of his wealth, or take issue with certain opinions he may have expressed in speeches, magazine essays or newspaper interviews.

All of these receive due consideration and even when a prominent humorist raps him hard—as one did a few weeks ago—he only smiles indulgently. No one realizes better than Andrew Carnegie that to be in the limelight of public view means many an unkind comment, as well as a fair quantity of praise, so he takes the bitter with the sweet with equal composure.

It is now time for luncheon. Mr. Carnegie steps into one of the automatic elevators and is taken to the dining room. There is not much done in Mr. Carnegie's room for an hour or two after dinner. He has spent more than an hour at luncheon, in domestic privacy, and when he returns to his den it is to sit quietly reading for an hour before the carriage is announced for the afternoon drive in the park.

But he cannot spend much time in the park this afternoon, for he is due to attend the opening of one of his libraries on the east side. He has promised to be present and make a short address, and he will keep his word. The carriage has been ordered to be in readiness on his return from his walk, and by 4 o'clock he is on the platform in the new building, facing a large audience. He shakes hands with a few scores of persons, and is rescued from some hundreds of others who would like to grasp his hand, and drives back to his home.

He is in particularly good spirits now, and is ready for a lot more correspondence. There have been several mails in the course of the day, and the mountain of letters which the secretary has winnowed has resulted in a pile for his personal consideration even larger than that which faced him in the morning. He goes through them rapidly, and then he has the evening New York papers and a lot of blue penciled papers from other cities.

Visitors have been coming and going all day, but, with the exception of a committeeman, he has not seen any of them. He has a public dinner engagement at the Waldorf-Astoria for the evening, and has no time to talk to any one whose business is not imperative.

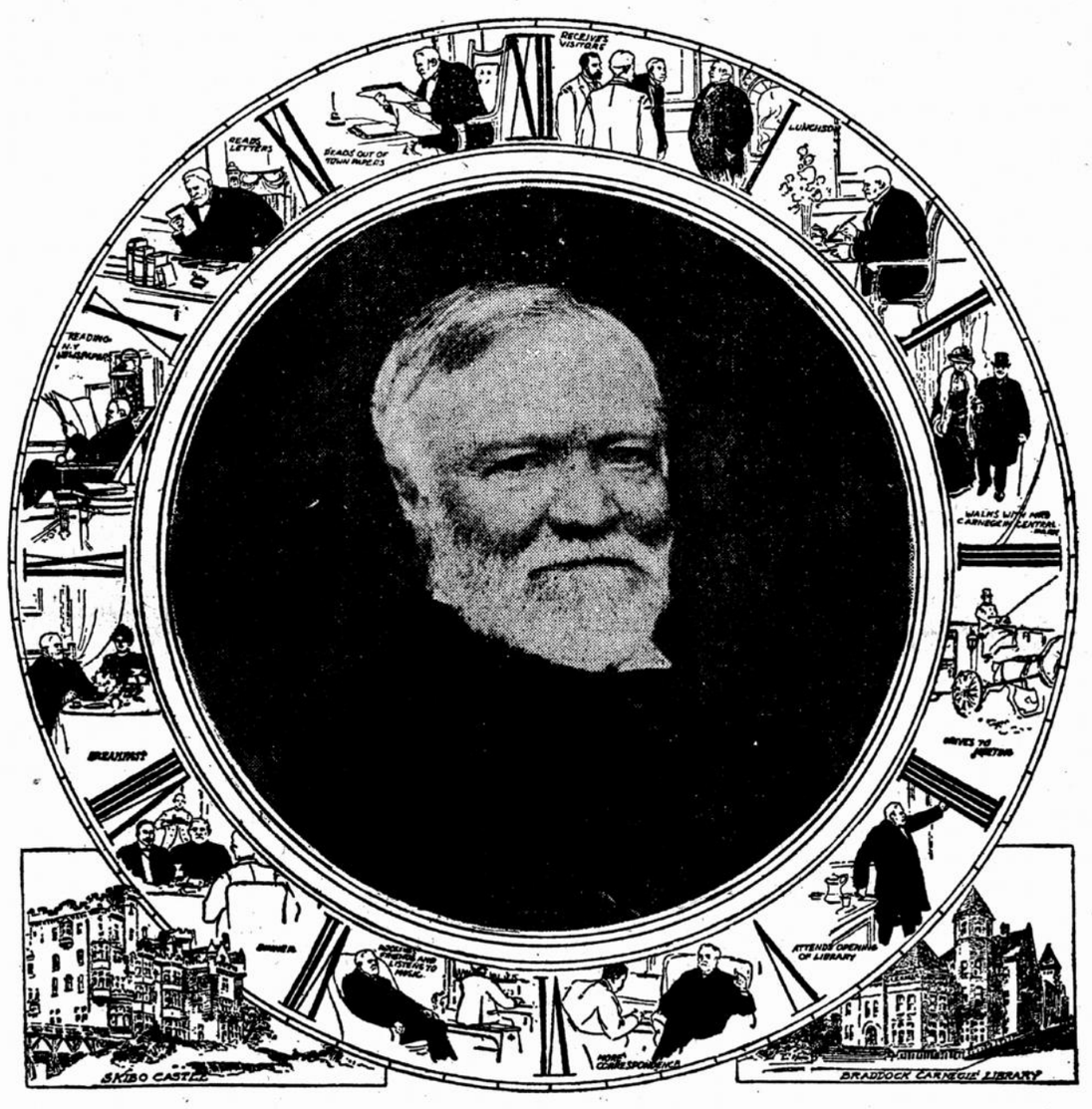
Six o'clock sounds from the big hall clock and its companions, and Bertram and Campbel disappear. As they go out a cheery voice is heard in the hall, and Mr. Carnegie smiles. He recognizes the tones. In another moment, Charles M. Schwab, president of the United States Steel Corporation to the world at large, but "Charlie" to Andrew Carnegie, is seated in the den, laughing and talking. They may talk steel business, but if they do it is only in a casual way. Andrew Carnegie has passed through a busy day, and he has still that dinner to attend at the Waldorf-Astoria.

"Let's have some music," suggests Mr. Carnegie, leading the way to the magnificent pipe organ, which is one of the luxurious features of the Carnegie palace.

"All right," responds "Charlie," as he seats himself in front of the instrument, "what shall it be?"

Andrew Carnegie has dropped into a chair in front of the fireplace, and his gaze is fixed among the red coals. He smiles without answering. The fingers of the musician sweep the keys and "Ye Banks and Braes" thunders through the great house. Then comes "Annie Laurie," followed by "The Bluebells of Scotland." The quiet figure in the chair is perfectly still, save for a gentle nodding of the head in time to the thrilling melody that brings back old memories, old times and many faces dead and gone. Again the air changes and there are tears in the music as the organ seems to say articulately, "Robin, Robin Adair."

Perhaps there are tears in the keen blue eyes of the great multi-millionaire and philanthropist, sitting so quietly before the fire. If there are, they cannot be seen, for the night has been closing in and the musician is playing by the sense of touch alone, as the listener still looks into the red coals, dreaming, dreaming, dreaming.—New York Herald.



Just Jones.

Golden Rule Jones, mayor of Toledo, Ohio, visited Mayor Low not many moons ago. He walked rapidly through the corridor of the city hall to the door of the mayor's office. There he met Secretary "Billy" Moran.

"Low in?" said Jones.

"Yes. Mayor Low is in. Card please!" said Moran.

"I'm Jones," said the mayor of Toledo.

"Walk right in, Mayor Jones!" said Moran.

The secretary had never seen the Golden Rule, not even a picture of him, but by one of the lightning mental calculations for which he is famous Mr. Moran worked out the identity of the man who had said, "I'm Jones." The Golden Rule and Mayor Low had a long talk.—New York Evening Sun.

RULERS AND THEIR TITLES.

European Monarchs Have Different Ways of Signing Documents.

Although the late queen of the British empire was accustomed to use her imperial title in signing public documents—"Victoria R. I."—her son and successor prefers the more simple "Edward R." This preference was especially noticeable in his coronation messages to his subjects last year. To the people of the United Kingdom he signed himself "Edward R.," but it was "Edward R. I." to the people of India and the colonies. Constitutionally this was strictly correct, for the titles act of 1876 stipulates that the imperial dignity shall not be used in Britain, but only in India. It is notable and characteristic that the German emperor, who is emperor only by reason of his position as king of Prussia, puts his imperial rank first and signs "William I. R." Sovereigns always sign at the top of the paper; hence the phrase, "Given under our hand and seal."

The reason is that no name may appear above the royal one. When Louis Philippe visited Queen Victoria at Windsor they went over Eton. Before leaving their signatures in the visitors' book were requested. The bourgeois king wrote his name first. Etiquette forbade her majesty to sign her name below his, and, with the readiest tact, she turned over a leaf to write "Victoria R." at the top of the paper. But the haughtiest signature is that of the king of Spain, who disdains names, and signs himself "Yo el Rey" ("I, the King"). The pope, unlike other temporal rulers, always adds his distinguishing numeral, "Leo XIII."

LOVING CUP HAS A HISTORY.

Long Connection with Famous English Men of Letters.

A loving cup with an interesting history has come into the possession of Sir William Treloar. According to the inscriptions on the cup, it appears to have been a present from Edmund Burke to Samuel Johnson in honor of the latter's stay at Beaconsfield in 1774. It then passed to Oliver Goldsmith, and on his death was given "to David Garrick and members of the Turk's Head club, as its fitting holders, to be quaffed from by each member present at cockcrow hour appearing." This club was a select literary coterie and was founded by Johnson and Reynolds in 1772, taking its name from an old coffee house in Gerrard street. Now known as "The Club," and of small but exclusive membership, it favors a hotel in Trafalgar square, London, when its occasional meetings are summoned. The present prime minister of England is a member.

Occasional Visitors.

A gentleman having an estate in the Highlands, as he was going abroad for some time, advertised the shooting to let, and told his gamekeeper, Donald, who was to show the ground, to give it a good character to anyone who called to see it.

An Englishman came down, and inquiring of Donald as to how it was stocked with game, first asked if it had any deer. Donald's reply was:

"Thoosands of them."

"Any grouse?"

"Thoosands of them, too."

"Any partridges?"

"Thoosands of them, too."

"Any woodcock?"

"Thoosands of them, too."

The Englishman, thinking Donald was drawing the long bow, asked if there were any gorillas. Donald drew himself up.

"Weel, they are no' so plentifu'; they jist come occasionally, noo and agin, like yourself."

Narrow Escape from Death.

Fantastic escapes from death were by no means uncommon features of the Boer war. There was exhibited some time ago in the museum of the Royal United Service Institution one of Queen Victoria's chocolate boxes, in the lid of which is still deeply imbedded a Mauser bullet. To that same collection there has just been added an even more remarkable relic. This is a silver cigarette-holder case, which was struck by a bullet at a distance of 1,200 yards while it was in the pocket of a captain of the imperial yeomanry. The curious part about it is that the officer was not aware until afterward that he had been struck, although the bullet also pierced the sovereign purse and cigarette case which he was carrying in the same pocket.

Danger in Both Manias.

There are certain Americans who are money-mad. They want to make millions upon millions and make them in a minute. There are a great many more Americans who are maddened by the thought that anybody should have a million. Between those who are trying to pile up and those who are bound to tear down there is a furious combat, productive of numerous incidental casualties among the bystanders. Both parties have been driven too fast and too far by their mania. It is time for them to get sobered and take some thought about the common interest.—New York Times.

A Picture.

A sweep of sky—deep blue—
And pure white snow upon a frozen river;
And fir-clad hills like sentinels, forever
Dark lined against the sky's bright hue.

A little sleepy hamlet, and a ridge
Of wharf above the frozen water.
Beyond them, down the river further,
A bit of roadway and a bridge.

And silence all around—
The brooding silence of a dying winter,
When nature bends her ear to catch a whisper
From springtime, stirring in the ground.