work instead of doing what is to be done, and falls into a swoon or goes into hysterics instead of helping the sufferer. And to a certain extent they are right. The weak women who scream when there is an accident, or faint at the sight of blood, may very frequently be put down as selfish as well as silly. Too often they are useless and in the way because they cannot forget themselves. They are so occupied with their own sensations and astonishment and horror that they can do nothing. If they had learnt that most difficult lesson, abnegation of self, they would be collected enough. But it is not always so. Want of presence of mind is also due to this miserable consciousness—"I ought to do something instantly, and I do not know what." Many a valuable life might be saved that now is allowed to slip away, if only this essential knowledge could be more generally diffused amongst all classes of society.

But whoever else may have, or have not, the power of self-control, the professional nurse *must* possess it. She must be able to keep calm, though all around her may be flurried, she must be collected when others are distracted, or she will prove herself quite unfitted for her work. And it is not given to every one thus to command themselves. Those who have the intention to become nurses and are doubtful of their power in this respect would do well to pause before they undertake work, failure in the right performance of which would mean not only disappointment to themselves, but pain and injury and perhaps loss of life to others.

Incompetent, ignorant nurses have had a long reign, and they have been the cause of an abundance of suffering to poor humanity. But there are hopeful signs abroad. Amongst medical men it is a recognised fact that good nursing is a most important factor in the cure of disease; and to supply what is wanted numbers of ladies, as well as women of a lower class, are seeking the special training that is required. It would appear that in some quarters there is a prejudice against the admission of educated women to the profession. It is thought that they are conceited and not inclined to be teachable and obedient. This reproach is partly deserved, and every lady who enters upon the work should endeavour to remove the occasion for it. Probationers are received at the different hospitals, and they usually pay for their training. When they have gone through the course they in some instances receive a certificate, or they may obtain an engagement at one of the Institutions for Trained Nurses, and so enter on their work.

Any one who desired to train for a nurse could not do better than seek an interview with, or write to, the matron of the particular hospital she would prefer to enter; and these ladies are always willing to give any information that is necessary. Hospitals are established in every large town. Amongst the principal of these institutions in London may be mentioned Guy's Hospital, Borough, S.E.; St. Thomas's Hospital, Westminster Bridge Road; Middlesex Hospital, Berners Street, Oxford Street; St. Bartholomew's Hospital, Smithfield; and St. George's Hospital, Knightsbridge. In each one of these, certain rules are laid down and followed, and the probationer must acquaint herself with them.

At Guy's Hospital the nurse probationers who enter are expected to remain as nurses. The management prefer to receive widows or unmarried women, from 23 to 35 years of age, who have been good domestic servants. This is simply because there is a certain portion of housework to be done which must be well done. These nurses can earn about £1 a week and full board wages. Ladies are received for a certain term at Guy's upon payment of 21s. a week. They are exempted from the rougher domestic work, but they are required to make their own beds and must pay for their own washing.

Nursing is grand work, and it calls for the exercise of great qualities. It is essentially a woman's work, for there are very few women who are not at one period of their lives or another called upon to engage in it. It is therefore most desirable that not only those who intend to enter upon it professionally, but that every woman should give thought to the subject and gain a knowledge of how it can best be done.

A very interesting and instructive little book has lately been written by Miss Wood, the Matron of the Hospital in Great Ormond Street, which gives excellent practical hints about nursing. This book is well worth perusal, and it would be most valuable for any one to refer to in an emergency.*

PHILLIS BROWNE.

THE GATHERER.

Beacon Lights at Sea.

The electric light has not only been successfully applied to the illumination of light-houses, but a Belgian inventor, M. de Sussex, has also applied it to light up floating buoys. The battery is attached to the buoy, and is kept in action by the sea-water acting as a solution. The electricity generated is passed through an induction coil, and the strong discharges from the latter traverse a vacuum tube and produce a bright glow. This contrivance is always in action, but the light only begins to be visible as night draws on. Gas has also been successfully tried of late for lighting buoys by the Commissioner of Irish Lights, following a method devised by Mr. J. R. Wigham. Pipes convey the gas from the shore along the sea-bottom. It is arranged that by a high pressure of gas a small light only shall be kept burning during the day; but when darkness comes on the pressure is diminished, and the light springs up to its full size. The labour of the

* "A Handbook of Nursing for the Home and the Hospital," by C. J. Wood. (Cassell Petter & Galpin.)

boatmen sent out to light beacons, and the dangers to which they are exposed in stormy weather, are by this plan saved. Further, by the plan of Captain Collison each buoy itself is made into a holder of gas compressed to ten atmospheres; and in a recent trial in the Channel this arrangement was found to light up the buoy for twenty-two days and nights in all weathers, and with a light which could be seen four miles by the glass and two miles by the naked eye.

A Steam-Carriage.

To persons of small pecuniary means, and also to invalids, there seems to be a pleasant and valuable luxury in prospect, which will be within their reach at comparatively little cost. To keep a carriage, however small, involves considerable expense; to hire cabs, nearly as much so, and very unsatisfactory; and to make an excursion and obtain the benefit of the air in an omnibus would be decidedly a miracle. No horses, nor coachman, will be required for this new vehicle, which is sufficiently large to hold three or four persons. It will be propelled by steam, yet without the noise and disagreeable smell, or the danger of an explosion, which hitherto have attended locomotives moved by such means. The burner is a modification of the benzoline lamp, and only one pound weight of water is heated at a time; so that such a small quantity of water would do no harm, even could it burst the strong half-inch pipe. After filling and lighting the burner there will be nothing more to be done during the drive but to guide the course of the carriage by the reins, and vary the speed, start, or stop by sliding the foot on a pedal. The small vehicle at present in question goes at a rate of about eight miles an hour on the level, and at about four up moderate hills; but it could be so arranged as to go at greater speed. The weight of the steam-power does not add more to that of an ordinary dog-cart than about 180 lbs. As to the cost of the benzoline used in the burner, it amounts to about three-halfpence a mile. These locomotives make no smoke, nor objectionable noise, and are much more under control than a horse; and thus, on every account, it is to be hoped that an amendment will be obtained, next Session, in the "Highways Act," freeing carriages of this description from the inconvenient restrictions still, yet very properly hitherto, imposed on "traction engines," on account of their noise and unsightly appearance.

A STEAM-CARRIAGE.

Is Gas Injurious to Books?

As gas is used in the vast majority of public and private libraries in the kingdom, some definite information upon the question as to whether or not it has a pernicious effect on the binding of books will doubtless be welcome. Our authority on the subject is Professor Wolcott Gibbs, of Harvard University, who was led to make several careful investigations into the matter, in consequence of a complaint that certain books in the public library of Boston—the second largest in the United States—were injured by the combustion of coal-gas. On that occasion he concluded that there was not sufficient evidence to show that the volumes were damaged in the way alleged. He afterwards examined some old books bound in calf in the College and Astor libraries (in neither of which is gas used) and in the Athenæum library (in which gas is used in the reading-room only), which presented the same appearance as the volumes that he had already handled in the public library. Taking a number of samples of the leather to his laboratory, he there analysed them and discovered no free acid whatever. A binder of large experience suggested that the injury complained

of might be due to the tanning of the leather and not to the action of gas, as the older kinds of leather once in vogue were of poor quality and badly tanned. This testimony would appear to be conclusive, and our question must therefore be answered in the negative. The librarians at the Guildhall should be able to throw some light on the subject, as they have used gas in their fine library, we believe, ever since it was opened. If they agree with Professor Wolcott Gibbs, we venture to think that it would be worth while at least to consider whether the British Museum library, the noblest in the world, might not be kept open, every precaution against fire being taken, until ten o'clock at night.

A Check upon Fares.

Amongst the newest and most useful of the inventions cropping up in every direction, there is one which will prove a boon to a very large proportion of the community; such a multitude of persons being compelled to drive in metropolitan "stage-carriages," otherwise called omnibuses. A gentleman has recently designed, manufactured, and patented a valuable ticket check, suitable for tram-cars, railways, omnibuses, steam-boats, and equally so for theatres, skating rinks, concert-halls, and, in fact, for any other purpose for which a check is required. The apparatus consists of a small, neat case of nickel silver, which may be suspended from the neck by a strap, or attached to the waist-belt. At the top there are three buttons—more or less, as required—like the keys of a cornet-à-piston. Near the bottom of the case there are a number of apertures, through which the ticket is ejected when the button is pressed. A person, for example, may require a twopenny ticket—a receipt for the money is delivered. Further, within the case, at the bottom of the ticket reservoir, are dials like those of a small watch, on which the number of tickets issued, and of the fares received, for each class are accurately denoted when the day's work is over. This check may be so constructed as to contain any number of tickets in as many divisions.

Another useful invention by the same person is a self-registering lock, which will indicate the number of persons passing into any closet, room, or public building in which it is employed. It will be readily understood that such a lock would naturally prove an infallible safeguard against fraud on the part of the employés or others.

Answer to Mesostich on p. 64.

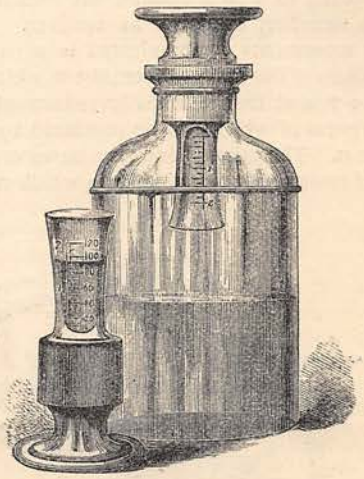
S H e
F O e
M o O r s
W i l D c a t

A Measuring Stopper.

A novel method of measuring medicines, and one very likely to prove useful to druggists and to those entrusted with the care of the sick, has lately been invented.

From the accompanying cut the convenience of the new stopper will at once be perceived. A small graduated measure is formed upon the inner end of the stopper, which is like the ordinary bottle-stopper, but has a flat head which forms a base for the measuring glass.

No loss of medicine can occur, as the stopper measure is returned to the bottle, and it may be frequently



used without washing, as no other liquid need be measured with it. Every bottle carries its particular stopper, and no mixing of medicines need be feared.

The Poplar as a Lightning Conductor.

Many observations have tended to prove that trees in the vicinity of water are excellent conductors of electricity. A very striking proof of this comes to us from Crans, on the shore of the Lake of Geneva.

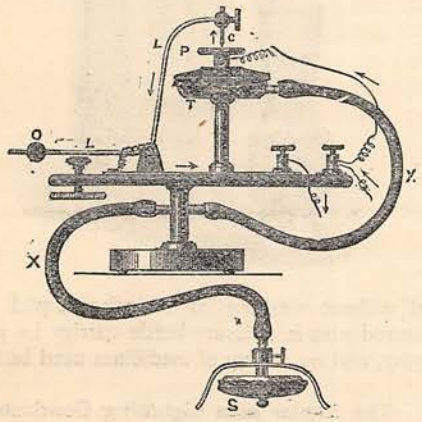
The conductor in this instance was an aspen (*Populus tremula*) and was by no means the highest tree in the immediate neighbourhood. Firs abound in the locality, but the electric fluid chose the poplar. Two large branches which surmounted it served as the conductors to the trunk, which was shattered; the branches were quite uninjured.

From this it would appear that trees, but more especially poplars, planted between a dwelling-house and a pond or reservoir of water would most probably prove a very efficient lightning conductor, and largely conduce to the safety of the house.

A Microphone Stethoscope.

In one respect, we are inclined to think sufficient justice has not been done to the microphone. Of course, all inventions worthy of the name must be useful or ornamental, but such a classification is obviously extremely vague, as in either category there are many degrees of the *utile* or the *dulce*. It was indeed predicted, when the microphone was first introduced, that it would probably be of considerable service in medical and surgical operations, but no great stress has been laid by the public upon that fact, perhaps because it was difficult to realise how the instrument could be brought into requisition. Our

engraving will partially resolve that uncertainty and ignorance. It represents an apparatus which consists mainly of a microphone and telephone placed in circuit. By means of its exquisite delicacy the feeblest beats of heart, pulse, or artery can be readily detected, and it is possible that its excessive sensitiveness might prove to be an absolute defect. Two tambours, S T, are attached to a microphone, the former of which acts as searcher, the latter as receiver. The most minute movements communicated to S pass, through the medium of the india-rubber tube X, which connects them, to T, and thence to the lever-microphone L, the sensitiveness of which can be regulated by the counterpoise O. The microphone terminates in a pencil C, made of retort carbon or plumbago, which rests upon a



disc P, of the same material, fastened on the receiver T. The whole forms a complete circuit, in which is a Daniell battery of from one to three elements, and the telephones, through which are heard the pulsations from the searcher S. This brief explanation of the microphone stethoscope will help to show its action. The instrument may be found susceptible of further improvement, but when modified to meet all practical requirements it will possess permanent value.

Luminous Paint.

We can store up mechanical power in weights and fly-wheels; we can store up what is called chemical energy in such explosive compounds as gunpowder and dynamite; we can also store up electricity in reservoirs or *condensers*, and we can concentrate magnetism to the point of saturation in steel bars; but radiant energy by its very nature would seem to elude our grasp. Nevertheless that it may yet be possible to store up heat and imprison daylight is shown by a recent English patent for luminous paint. It is known that there are a number of phosphorescent minerals, sulphurets and sulphates of lime and barium, alabasters, &c., which after being exposed to the light become luminous in the dark, emitting a soft glowworm light. A patent taken out by Mr. W. H. Balmain involves the novel idea of mixing paints and varnishes with the best of these salts, so as to obtain surfaces luminous by night. The only practical application of the process which has been made yet is the coating of clock-faces with the composition, thus rendering them luminous in the dark. This is a small beginning; but most great things in science have small beginnings. It may be that a chemical compound or a mineral will yet be found possessing this property of storing light in so high a degree that it may be used for lighting purposes; the walls of apartments, the sides of streets and alleys, ships, buoys, and many other things being self-luminous when painted with it. Perhaps when the electric light has reigned awhile, the luminous paint will usurp its place!

Answer to Double Acrostic on p. 63.

T ear S.
H ecat E.
O per A.
M a r S.
S o l O.
O rio N.
N ou S.

A New Invalid Water-Bed.

This water-bed, which has received the prize medal of the Sanitary Institute of Great Britain, is the invention of Mr. Millar, L.R.C.P. Unlike the ordinary air or water-bed, which is made in one part, Mr. Millar's bed consists of a number of separate cylinders, which can be filled with air or water at pleasure, and removed or altered in position at will. By this plan a damaged tube can be withdrawn without disturbing the patient; and free ventilation is secured by the air-spaces between the tubes.

Liberian Coffee.

Coffee grown in the interesting negro republic of Liberia is stated to be rapidly acquiring a high reputation for delicious flavour, and there are some who do not hesitate to declare that it is superior in this respect to the long-established favourite which hails from Arabia. We do not hear much about it, for the reason that it is in great demand in the United States, but it is now "inquired after" in the home markets, and it is not unlikely that it may secure a firm footing in popular estimation. The *Coffæa Liberica* is a finer and more robust species than its cousin plant, and is amazingly prolific. A planter who risked a visit to the West African coast to judge for himself, came to the conclusion that a well-tended estate of twenty or thirty acres would yield as much coffee as an estate of 200 or 300 acres of Arabian or Ceylon coffee. He says that the "berries" are as big as plums, and the unpruned leaf has no disease. It has the advantage of growing equally well near the sea and at a considerable distance from it, and attains a height of over twenty feet. The natives regard it, not as a shrub, but as a forest tree, and point to some specimens more than forty years old and flourishing, as a report on the subject puts it, "in all the vigour and verdure of youth, and bending down under their weight of berries."

A Railway up Mount Vesuvius.

A concession has been granted to a Neapolitan banker to construct a railway, like that of the Righi, up to the crater of Vesuvius for the convenience of

visitors. The line will be a double way supported on iron trestling, and it will be arranged that four cars will be ascending while other four are descending the mountain. A 12 horse-power stationary engine will move the cars; and an automatic brake will stop them, if any accident should occur. The line will be about 900 yards long, and the gradient 1 in 2.

Edison's Micro-Tasimeter.

Previous to his recent invention of the new electric light, the micro-tasimeter, or measurer of infinitesimal pressures, was the latest of Mr. Edison's many scientific marvels. Hitherto the thermo-pile has been the most delicate of heat-measurers, but in point of sensitiveness it is far excelled by the micro-tasimeter for this purpose. It is well known that in the Edison carbon telephone, as in the Hughes microphone, the impact of sound-waves on the carbon diminishes the resistance of the carbon to the passage of a current of electricity. The transmitter of this telephone consists of a solid button of fine carbon placed between two discs of platinum, a current of electricity being caused to pass from one of the discs *through* the carbon to the other disc. On speaking against one of these platinum discs, the pressure of the sound-waves upon it modifies the internal resistance of the carbon button to the passage of the electricity, and an undulatory current is the result, with undulations strictly following the waves of sound. This current when passed through an electro-magnetic receiving telephone reproduces the sound itself. Now, the only difference between the micro-tasimeter and this carbon telephone is, that instead of the pressure on the carbon button being caused by the impinging waves of sound, it is caused by the expansion of some substance very sensitive to heat; and instead of a receiving telephone being used to indicate the variations of the current thereby produced to the ear, a well-known current measurer, or galvanometer, is employed to show them to the eye by the deflection of a pointer or needle. Change of pressure is what is really measured by the micro-tasimeter, increase of pressure on the carbon giving an increased current in the galvanometer; but change of temperature is made to cause this change of pressure. For this purpose a slip of hard rubber or ebonite, which lengthens on being heated, is horizontally fixed, so that one end bears against the platinum disc shielding the carbon button; and so sensitive is this arrangement that the heat of the hand held near it causes a deflection of many degrees on the current measurer. A cold body held near the ebonite gives a proportional deflection in the opposite direction. A strip of gelatine is similarly expanded by moisture from a dampened piece of paper held near.

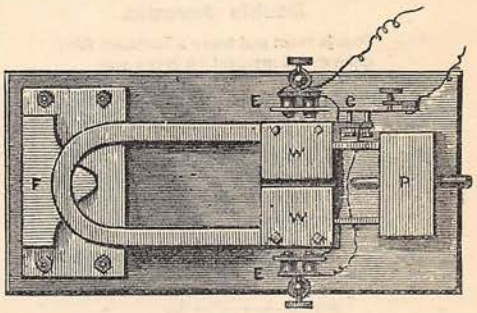
The micro-tasimeter was first practically tried during the recent solar eclipse; and it proved sensitive to the radiation from the outer edge of the corona. Mr. Edison hopes in time to apply the principle of it to delicate thermometers, barometers, and hygrometers; but the most daring application proposed for it is that of exploring those blue fields of the night-sky which to the eye are void of stars, in order to discover the unseen orbs which tenant them. His plan is to adjust the tasimeter to its utmost sensitiveness, then attach to it the exploring telescope, when, if in any particular direction of the latter there is a marked and invariable deflection of the tasimeter, it may safely be inferred that there is an unseen world in the line of sight. In this way we may yet discover worlds which the telescope cannot reveal, burnt-out suns and feebly-shining planets, now unknown because not luminous.

Extinguishing Chimney Fires.

The fumes of burning sulphur have long been employed by the firemen of Paris to extinguish chimney fires; but it has been found by M. Quequet that sulphuret of carbon is much superior to it for this purpose. A hundred grammes (quarter of a pound) of the liquid sulphuret of carbon burnt in one or two flat basins on the hearth very soon stifle the glowing soot by the mixture of sulphurous acid and carbonic acid gases which they give off. During the first three months of 1878, the Paris firemen put out 251 of 319 fires by this plan.

The Harmonic Engine.

Since the electricity derived from voltaic batteries was discovered, many attempts have been made to employ it as a motive-power, and especially by the help of the attractive force of electro-magnets, rendered magnetic or non-magnetic according as the current was allowed to actuate them or not. In all these electric motors, the source or origin of power was the chemical action in the battery, the zinc or oxidisable metal of the battery being consumed or burnt like fuel in a furnace, and in its combustion or oxidation yielding the electric energy. The amount



of energy which could in this way be obtained in proportion to the weight of fuel consumed is so great compared with that derived from burning a great quantity of coal, that for locomotives, and ships which carry their own fuel, an electric engine would have a great advantage over a steam one. But it has been found that, power for power, the cost of zinc is greater at present than the cost of coal, and so electric motors have not yet found their fitting time. Theoretically, they are more efficient than steam ones; that is, they

perform more actual work for the work-value of the fuel consumed than steam ones; and in this respect they come near to the animal body, which, regarded as a machine, is the most perfect of all. Although for the larger uses electric motors are still kept in the background, they are beginning to obtain a sphere of usefulness, on a small scale, in the household; and Mr. Edison has recently invented a little one, which he calls a Harmonic Engine, designed for this purpose; and he claims for it that it realises in actual work some ninety per cent. of the power of the current which drives it, an efficiency which comes very close to that of the animal body. Our engraving represents a plan view of this engine, which consists of a stout tuning-fork, F, two and a half feet long, and made of two-inch square steel. The fork is fastened at its curved part to a solid casting bolted to the wooden base. Each free end of the fork carries a flat 35-lb. weight, W, as shown. Outside these weights, but very close to the sides of the fork, are fixed two small electro-magnets, E E. These electro-magnets are connected in circuit with the battery, which consists of three or four ordinary galvanic elements, in such a way that by their attraction on the steel arms of the rod they maintain the latter in vibration. This is done by causing the fork itself set in vibration to "make and break" the current in the electro-magnets by a commutator, C, so that the latter, by the impulses of their attraction, assist the fork to keep vibrating harmonically. The fork vibrates thirty-five times per second, and the range of each vibration is one-eighth of an inch. Small arms extend from the arms of the fork into a miniature pump, P, which raises a small quantity of water at every stroke. With this contrivance Mr. Edison proposes to compress air, and use it as a means of driving sewing-machines, coffee-mills, or other light machinery in the home or the workshop.

Double Acrostic.

Sounds sweet and true; a landscape fair;
Colours well matched; a happy pair.
* * * *
A jarring note; harsh biting words;
An angry sea; and clashing swords.

Long while ago this country swept the main,
And London heard, dismayed, her cannon roar;
But her dominion she could not retain,
And we her rivalry shall fear no more.

If you can prove *this* 'tis quite clear
You could certainly not have been there.

A palace in a valley fair
A prison was to me;
For I grew weary of my lot,
And longed the world to see.

One fatal day this little craft appeared,
And soon a mighty man-o'-war lay low;
How could her wooden sides withstand the crash,
With iron ram, of that fell tearing blow!

He could wrestle with skill,
Which perhaps saved his life;
He loved a duke's daughter,
And gained her to wife.

He could not wield the spear, nor cast the dart,
Nor guide the raging coursers o'er the field;
But in the council who so wise, whose heart
So sage? All trust him, all minds to his yield.

Here live the worshippers of fire,
Who of their duties never tire;
Their fires have been alight, 'tis reckoned,
Three thousand years—nor quenched a second.

Solar Cooking.

One of the most interesting exhibits at the Paris Exhibition was the solar cooking apparatus of Professor Mouchot, to whom a Cross of the Legion of Honour has been awarded. Archimedes of old is said to have won himself great renown by setting fire to the ships of a hostile fleet with the concentrated beams of the sun; but M. Mouchot has achieved a humbler triumph in turning them to the peaceful uses of the kitchen. The sun is known to be a great fire in whose rays the world perpetually turns round and warms itself. Why not use this fire for cooking, although it is so far off? Its heat at the earth's surface is too diffused to cook directly, but it may be concentrated either by lenses or by mirrors which focus the rays while they reflect them. It is with mirrors that M. Mouchot works. Concave mirrors are employed to catch the sunlight, and focus them by reflection on a glass tube, enclosing a tubular still if spirits are to be distilled, a kettle if water or eggs are to be boiled, a gridiron if a chop is to be cooked, and so on. It is a simple apparatus, but M. Mouchot works wonders with it even in our cloudy latitudes. He makes coffee, boils eggs, distills wine into brandy, works a steam-engine, and roasts beef with it. There is something of the magician in M. Mouchot thus making a hearth of the world and cooking by the heat of the sun. With a mirror two square feet in surface area, he roasted two pounds of beef in twenty-two minutes at Paris; in one hour and a half he cooked stews which on an ordinary wood fire would have required about four hours to prepare; in half an hour he boiled nearly a pint and a half of cold water. If these feats may be done at Paris, what may not be done in the clear dry air and under the burning sun of Algeria, Egypt, and India, or on those sandy deserts where there is no fuel to be had for the burning, while the fierce rays of the sun stream down on every side? The Russians, who are not slow to profit by any novelty which comes under their notice, have been taken with M. Mouchot's apparatus; and the Grand Duke Michael, while at the Exhibition, ordered several of the portable solar cooking apparatus for the use of the Russian army now under General Kauffmann, at Tashkend, on the plains of Turkestan. The working of stationary engines by M. Mouchot's plan is not the least interesting of its applications, and if these engines were employed to produce artificial cold and freeze water, we should have the curious anomaly of the sun's rays creating, instead of dissolving, ice and frost. Of course such an invention could scarcely be of much use in a country whose skies are frequently clouded.