

THE GATHERER.

A Novel Inclined Railway.

To the town of Lyons belongs the honour of bringing into use a new system of railway upon inclined planes of different gradients. When the slope is uniform throughout on any traction line, the velocity of the descending train will suffice to balance the other, the motor force being an engine working the cable-drum at the top, and powerful brakes control the action of the descending wheels. But recently a new line has been opened between Lyons and the quarter of Fourvière and St. Just, Fourvière Station being equidistant between the other two. In order to get daylight

truck, *b*, provided and connected by supplementary cable with train B, to give it the required resistance. When train B has ascended to St. Just, its truck *b* has reached Fourvière, where truck *a* was at first. The descent of B is then accomplished in the same manner as that of A. (See Diagram 3.)

The mode of attaching these supplemental cables and the trucks is very simple. The upper end of the cable is fitted with a grapnel, which catches a bar underneath the carriages, and hooks itself when the cable becomes tight.

The Albo-Carbon Light.

Every one has seen those brilliant jets of flame which shoot out from a gassy piece of coal in the fire. They are at first puffs of gas mixed with smoke, but catching fire they blaze with a dazzling whiteness. The carbon particles supplied by the smoke enrich the gas, and the result is an intenser light. It is upon this plan that the Albo-carbon mode of burning gas is based. Albo-carbon is a semi-transparent solid, obtained as a residuum of creosote. It is moulded into rolls, and pieces of it are placed in a holder, through which the ordinary coal-gas is made to pass on its way to the jet. The holder is warmed by the burning jet, and the heat volatilises the albo-carbon. The vapour given off from the latter mixes itself with the gas, which it enriches, and the illuminating power of the gas-flame is at least doubled. At a recent trial in the Westminster Aquarium 200 albo-carbon burners successfully took the place of 500 ordinary ones. The cost of the albo-carbon is small compared to its equivalent in coal-gas. A thousand cubic feet of gas albo-carbonated are said to be equivalent to 3,000 cubic feet in lighting power, and the mineral required to produce this effect costs only 1s. 6d. The albo-carbon is inexplosive, portable, and leaves no ash; although undoubtedly the air of a room must become more vitiated by its use. The invention has been developed by Mr. James Livesey, C.E., Westminster.

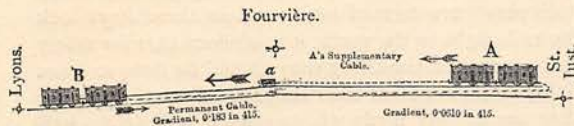


DIAGRAM 1.—Showing train A starting from St. Just, pulling B up, with assistance of weighted truck *a*.

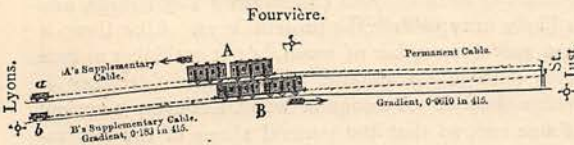


DIAGRAM 2.—Showing the trains half-way on their respective journeys. Truck *a* is now detached, and *b* is coupled to B by supplementary cable.

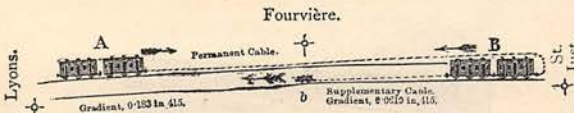


DIAGRAM 3.—Showing train B at St. Just, ready to start back in its turn, assisted on the less incline by its truck *b*.

at the Fourvière Station (for the line is underground) an alteration of the gradient was necessary, and the line from Lyons to Fourvière is steeper than from thence to St. Just. It will therefore be seen that the train descending upon the lesser incline would not balance the train upon the steeper.

M. Grivet, the engineer, has discovered an ingenious plan, by which all difficulties are obviated as follows:—A train, A, is ready to start from St. Just. He attaches to it, by means of a second cable, a weighted truck *a*, so calculated that it and the two carriages of train A on the less incline will exactly balance train B on the steeper ascent. (See Diagram 1.) Thus when train A passes Fourvière its truck is at Lyons, and train B is also at Fourvière. (See Diagram 2.) A will now have to pass down the greater incline, and no longer wants the assistance of its truck *a*, which is automatically detached. But train A, now on the steep line, would overbalance B on the less incline, were not a second

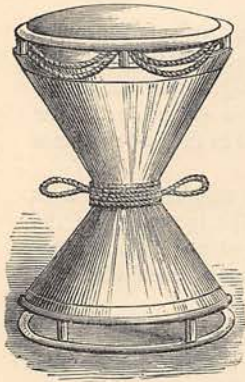
A Cure for Hydrophobia.

Hydrophobia, we are told, can be prevented. The following remedy, known as the Goodman remedy, has been tried with surprising success. It is very simple. The first dose is one and a half ounces of elecampane root, bruised, in a pint of new milk which has been reduced one-half by boiling. This must be taken all at one dose in the morning, fasting till the afternoon. The second dose must be two ounces of the elecampane root, in milk as before; the third dose as the second. Three doses are sufficient to remove all ill-effects of the bite. A dose for a horse or a cow should be four times the above, and if the doses be administered any time *before* the appearance of the spasms they will be efficacious.

Life Preservation at Sea.

The accompanying diagram is an illustration of a useful little invention of a Londoner. It is a life-buoy possessing merits of infinite variety. First of all, it is a seat, with a cork cushion—very comfortable. Secondly, it is a water-bottle, biscuit-tin, money-box, and a safe, in which valuable papers may be preserved in case of wreck. Its material is block-tin, and the shape similar to that of an hour-glass. This convenient life-buoy can be unscrewed so as to sustain the bodies of two men when required. The buoy refuses to sink, being buoyant in the extreme, and at a recent trial

could not be submerged without heavy pressure of solid metal. Should a fire take place on board ship, the seat could be unscrewed and converted into a couple of water-pails.



Domesticated Buffaloes.

A certain Colonel Miller, of New Jersey, has tried an interesting experiment, and has, at any rate, convinced himself that the formidable buffalo—the terror of the wide prairie—is, when compared with a young Alderney bull, a puny creature. On the other hand, the wild animal appears to possess qualities which, from a commercial point of view, should endear him to us. He is not difficult to tame, and he develops fat much more rapidly than the domestic ox, and on much less food.

Travellers find that, with the exception of certain portions, the flesh of the wild buffalo is tough and tasteless; not so the domestic animal. The latter is quite as good to eat as our average beef; and, indeed, we may have had unsuspected opportunities of judging lately. The milk of the female is reported to be very sweet and rich, and yields more cream than ordinary Alderney milk. In every respect, then, the buffalo is, at least, equal to our domestic cattle, and as regards his hide he is far superior. The value of the buffalo-skin is four times that of our ox-hides, and by careful tending might be made still greater.

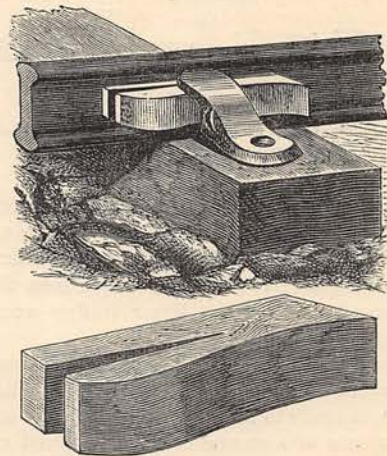
Photography by Gas-Light.

As soon as the electric light was introduced, it was at once obvious that it could be pressed into the service of the photographer, thus rendering him, if he chose to use it, practically independent of the climatic fickleness for which our country bears an unenviable reputation. But it also became obvious, and that speedily, that the great cost of the new light would debar a large majority of "likeness-takers" from adopting it, and they had accordingly no alternative but to maintain the present system, with all its drawbacks. It appears, however, that ordinary gas can be

utilised in the studio with satisfactory results, and without any extra cost to speak of. By an "exposure" of eighty seconds good portraits have been secured. In this case the burner employed was one of Wigham's lighthouse combined jets, like those used in the lamps at the foot of the Thames Embankment, opposite the Houses of Parliament. Compared with the cost of electric light, the expense of gas—which is simply the additional gas consumed during the time of exposure—is a "mere bagatelle." It is therefore clear that, with the assistance of a 68-jet burner, photographers need have no difficulty in granting "sittings" by night as well as by day.

A New Railway Key.

The wooden wedges which fix the rails of a railway to the cast-iron "chairs" supported by the wooden "sleepers" are termed keys, and as these keys lock the rails tight to the earth, it is obvious that for safety and comfort of travelling they should be firm, and not liable to come out of their sockets. For this purpose they are usually made wedge-shaped, and driven well home by the surfaceman's hammer. A company at Blyth, Northumberland, have introduced a new key, which has been adopted on the great Tay Bridge, and is likely to supersede the present keys. Like these it is simply a short bar of wood, but it is thicker at *both* ends than in the middle, whereas the older key is wedge-shaped. A wedge of wood, however, is cut out of one end, so that the general shape of the key resembles a wooden clothes-pin. This split end is inserted into the chair, and the key is driven home until it appears at the other side of the chair, where



the split end opens out again with a spring-like action and jams the key in its place, as shown in the accompanying figure.

Restoring Faded Flowers.

The majority of flowers begin to wither after being kept in water for twenty-four hours. A few may be

revived by giving them fresh water with a pinch of saltpetre in it; and even quite withered flowers can be restored by placing them in a cup of boiling water, deep enough to cover at least one-third of the stems. When the water has cooled, the flowers should be bright and erect again. They may now be inserted in fresh cold water, after having shortened their stems by about an inch. Thin-petaled, white, and light-hued flowers, however, do not revive so completely under this treatment as deep-hued, thick-petaled blossoms.

The Paragon Pentagraph.

The ordinary pentagraphs, or instruments for making reduced or enlarged copies of a drawing or plan, now in use, are ingenious linkages of brass rods carrying two pencils or styles, one of which traces out the original plan, while the other makes the proportioned copy. The Paragon Pentagraph, of which we present an engraving in scale, takes advantage of the elastic property of india-rubber for producing smaller or larger copies of designs. The design is first drawn in lithographic ink on a stone or copper-plate, as the case may be, and by means of a suitable framework fitted with adjusting screws, a thin sheet of india-rubber coated on its face with an adhesive composition is stretched out, then pressed evenly and face downwards on the stone.

On raising the rubber again by its frame, the design is found adhering to its face. All that remains to be done, then, in order to get a reduced copy of the latter, is to allow the rubber to shrink to the required extent by means of the adjusting screws, then to press it upon the stone or paper upon which the copy is to be imprinted. To obtain an enlarged copy, this process is simply reversed, the rubber being *stretched* after receiving the design, instead of *shrunk*.

A Novel Envelope.

It is often important that letters should bear the post-mark and date of their transmission, but under our present system of enclosing them in sealed envelopes the document itself cannot receive the impression of the Post-office stamp, which is printed on the envelope alone. An ingenious way of overcoming this difficulty has been devised by M. Depelly, a French postal official, which neither increases the price of envelopes nor takes up the time of the Department. It consists in applying a sensitive chemical preparation to the

interior of the envelope, which, under pressure of the postal stamp, marks a second impression on the enclosed letter, as distinct and durable as that on the envelope outside.

The Heliograph.

The beams of the sun reflected from mirrors have long been used as a means of signalling. The fleet of Alexander the Great was guided along the Persian Gulf by reflectors; and the North American Indians have from time immemorial signalled over the prairies by sun-flashes. In England the heliostat of Colonel Colley has been used for years to offer a "sight" object to the theodolite in the Government survey, but this instrument does not permit of conversation being carried on. The heliograph of Mr. Mance is specially designed for communicating intelligence by sun-

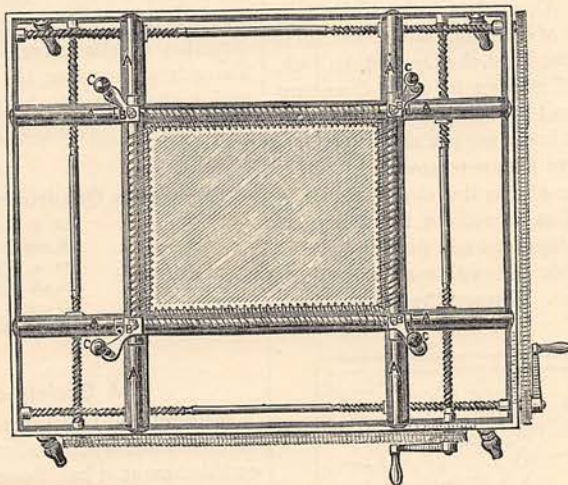
beams; and in Persia or India, where the air is clear, signals can be exchanged 100 miles. It consists of a mirror mounted on adjusting mechanism, by which the sun's rays can be directed with great precision to any spot, notwithstanding the sun's apparent movement in the heavens. By the pressure of a finger-key the flashes of light sent from it are made of short or long duration, thus adapting the signals to the well-known Morse or telegraphic code, by which the letters of a word are indicated by a group of short or long marks. Thus the signal "All's well" would be represented on the Morse code by—

— A — L — L — S — — W — E — L — L —

A second mirror is provided to allow of signalling being carried on, whatever the sun's position. The whole instrument weighs from six to eight pounds, and is supported on a light tripod. The electric light can be used in connection with it by night. For explorers, surveyors, and for armies in the field, the heliograph is especially useful.

A Tell-Tale Letter-Box.

A handy letter-box—which strikes a bell once when the lid is opened to admit a letter, and again when the lid is closed, thus imitating the postman's double knock—has been contrived by Mr. A. Bennet, of St. Paul's Square, Birmingham. The flap of the letter-box carries a bell cup, with a clapper fixed to a rotating cog-wheel, which works in a toothed quadrant fixed to the box. When the flap is raised this cog gears in



the quadrant, and causes the clapper to hit a projection on the inner lip of the bell, thereby sounding the latter as it passes. When the flap falls back again, the returning clapper again strikes the projection on the rim and repeats the tone.

A Railway in Central Asia.

The Grand Duke Nicholas of Russia has given the public some interesting information respecting the past history of, and future plans for, the Central Asian Railway. The line is to be constructed between Orenburg and Tashkend, a distance of 1,710 kilometres, and will run in a direct line as far as Kara-Tongai, a town on the Sir-Daria river. From this point the railway will follow the right bank of the river, and be constructed along the Jaman-Daria upon an embankment, so that the water of the stream may be diverted from the Kara-Uriak, which will then be available for culture by irrigation. The engineering difficulties are very few, and not great. Along the course of the railway there is abundance of running water, which is connected with basins of the Ural, the Or, and the Ileik. The line crosses "forage" steppes between Orenburg and the Mongojar Hills and the sandy tracts of Kara-Koom, but fortunately the latter are not shifting sands, and all fear upon that score is now removed.

Not contented with the above, the Grand Duke is preparing another expedition to set out this summer. This will pursue the investigations still further, beyond Tashkend and Samarcand. It will even push into Afghanistan towards Cabul. Thence the party will go



on to Khiva and study the topography of the river Amu-Daria, and so on to its mouth in the Caspian Sea.

An Electric Blowpipe.

It is well known that the electric arc is competent to fuse the most refractory metals and minerals. Platinum burns with brilliant scintillations, and porcelain melts like wax in its violent course. Even

chalk, which withstands the high temperature of the oxy-hydrogen flame, is melted in the intense light of electricity. This property of the arc is likely to be put to some practical use before long. Already it is of the greatest service in spectrum analysis for subliming metals and minerals into glowing vapour; but it has not hitherto been much applied in the arts. Plans have been patented, however, for employing it instead of diamond rock-drills, or other borers, to cut blast-holes for gunpowder in tunnelling, or in quarrying hard stones; and the distinguished French physicist, M. Jamin, has just adapted it as a chemical blowpipe. For this purpose he has had to give the arc a pointed shape, which is a matter of some difficulty in the case of the electric stream. He employs two sticks of carbon, placed side by side, but separated by an air space, and sends the current up one and down the other—the arc being established in the air space between the tips. Under these conditions the arc is quite straight; but on curving one of the wires carrying the current round above the arc, so that the direction of the current in the arc and in the wire above it is the same, the arc is attracted to the wire and pulled out in the middle until it assumes the form of a jet, like a blowpipe flame.

Answer to Quadruple Acrostic on page 384.

G i G u E I A (the source of the
 E x c e R P T Guadiana)
 O v E r w e I g H
 R o b E s p i e R r E
 G e s t i C U l a t i o N
 E p h E S u S

A Society of Housewives.

A useful and novel institution was founded last year in Berlin—to wit, a society of housewives. Since its establishment it has flourished so well, that a laboratory for the analysis of articles of food, presided over by a skilled chemist, has been fitted up for the benefit of the association. Here lectures on practical chemistry are delivered to members; and lessons are given in the analysis of dietary substances. A cookery school is attached. The society also encourages faithful service on the part of domestics, by awarding prizes to servants who have stayed five years in the employment of any member; and takes pains to provide places for good servants amongst its body. This practical scheme of the German ladies is well worthy of the consideration of their English sisters.

Violet Powders.

The public alarm excited last year by the numerous deaths due to the use of arsenical violet powders has led an experienced chemist, Dr. Dupré, F.R.S., to measure the absorbing power of these absorbents. The powders tested were composed of the following materials:—Bermuda arrowroot, corn-flour, wheat-starch, potato-starch with a little magnesia, corn-flour with a little magnesia and orris-root, fuller's-earth, and two kinds consisting almost entirely of crystallised

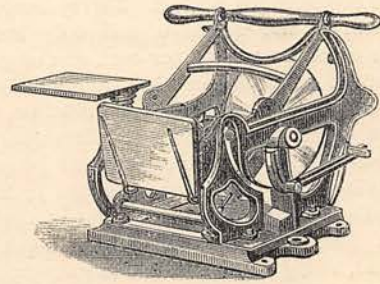
sulphate of calcium or selenite, which were decidedly harsh to the touch, and under the microscope showed a mass of small crystals, sharper than needles; they being, as Dr. Dupré remarks, altogether as unsuitable stuff for dusting the delicate broken skins of babies as could well be selected. Of these the fuller's-earth powders proved to be the most absorbent; next came those of potato-starch, wheat-starch, arrowroot, and corn-flour in order; but the selenite powders absorbed only about half as well as the others. Violet powders of fuller's-earth or potato-starch are therefore to be preferred, and those of selenite are to be avoided.

A Cure for Intemperance.

An American physician has discovered a remedy for intemperance, which is said to be thorough in its operation, and to result in a perfect cure. He starts with the assumption that drunkenness, manifesting itself in the first instance as a habit, afterwards develops into a disease of the nerve-cells. To bring out clearly the action of alcohol upon the system, it may be well to contrast it with that of food. The latter goes to the stomach first, then to the heart, and then it passes through the arteries to the brain. Many hours, at least four, are consumed in this process. Now, alcohol proceeds direct to the nerve-cells, from which the brain is stimulated in three minutes, clearly showing that it has been undigested. From the brain it goes to the spinal centre, thence to the muscular system, and ultimately it reaches the stomach, reversing at each step the action of food. Now, these nerve-cells should be stimulated, naturally through the blood, and when they are subjected, as by alcohol, to an unnatural stimulant—and especially when this is done habitually—the cells crave larger and larger doses, till by-and-by a man can drink an enormous quantity of whiskey every day. The remedy stops the call for alcohol. The recipe in question is compounded from a pound of the best quill red Peruvian bark (*Cinchona rubra*), which is powdered, and then soaked in a pint of diluted alcohol. It is next strained, and evaporated to a half-pint. A tea-spoonful is given every three hours, the tongue being occasionally moistened between the doses on the first two days. On the third day the dose is reduced to a half-spoonful, then to a quarter-spoonful, then to fifteen, ten, and five drops. The treatment lasts in extreme cases to thirty days, but seven days is about the average. We have seen that the nerve-cells when unnaturally stimulated call for larger doses of alcohol, and the object of the cure, it was stated, was to put an end to the craving. Well, the medicine is a natural stimulant, but contains no poison; accordingly, the nerves are stimulated, and the inflammation is gradually allayed through the absence of the poison. In short, the cells are held open until the morbid deposit is ejected, and they accustom themselves to receive their stimulus in the natural manner, through the blood. Patients who have submitted themselves to this remedy have been not only cured of their disease, but have lost all desire for drink.

A Novel Printing Press.

A novelty in the shape of a small printing machine has been produced by a Birmingham company. Although the space it occupies is small, the machine is



perfectly capable of accomplishing good work, and on this account it will be used by job-printers, stationers, and manufacturers innumerable. The name given to it is "Simplissimus," because it is simple in construction, containing as it does a remarkable fewness of parts, which, in addition to making it an inexpensive article, also affords it less opportunity of getting out of order. The illustration will show the construction of the machine; it represents the act of laying a sheet on the "frisket-arms" with the right hand, the left holding the handle. On drawing the handle down it is evident that the rollers must pass across and ink the type lying at the bottom of the press. The machine is so constructed that any sized "forme" can be used with equal facility.

Shakespearian Double Acrostic.

A brother and a sister here we find,
To whom the Fates adverse were most unkind;
Though high their birth and pure their life,
Their course was marked by grief and strife.

His lady-love was true and fair and wise—
At least she was so in her lover's eyes—
And yet, he said, she was a little shrew;
She may have been—her father was a Jew!

Ah, queen, too fond, too fair,
'Mid choicest fruits of earth I lie,
And poison all unhallowed joys:
To thee I now draw nigh.

To me Anteos owed his charmed life,
While touching me he conquered in the strife;
Which Hercules, well knowing, lifted high
The giant wrestler thus condemned to die.

Oh, look at the bride and the bridegroom so gay;
The horses are ready, why need they to stay?
They are waiting for me—I am thrown in a shower—
And I, with good wishes, will form their first dower.

He shoots, but now no fallow deer
Falls to his erring aim;
But a king lies low. He flees in fear,
And hastes beyond the main.

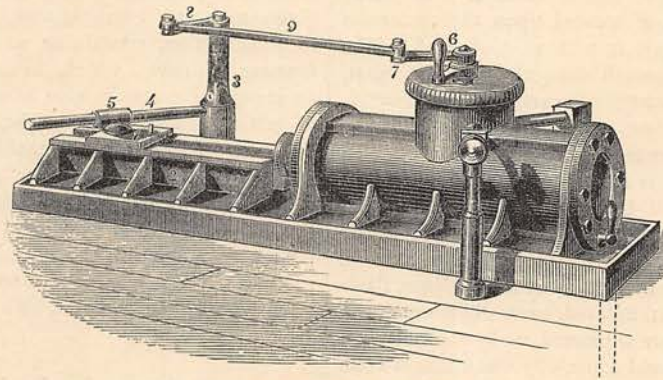
Many people in Turkey this title acquire,
A synonymous term for our English "Esquire."

A desert this long years has been,
But schemes at length are rife
To make of it a fairer scene,
And fill its wastes with life.

A New Miner's Safety-Lamp.

The presence of fire-damp in mines is, as is well known, detected by the ordinary safety-lamp, in which an oil-flame becomes surrounded with a blue aureole when the explosive gas meets it. This system, although convenient, is not sensitive, and only marks the presence of at least three per cent. of the gas in the air. But the researches of Mr. Galloway have shown that pit-air, impregnated with fine coal-dust, becomes explosive when it contains only three-quarters per cent. of fire-damp. The new method proposed by MM. Mallard and Le Chateüier consists in having in every gallery a lamp in which a jet of *hydrogen* is burning. The hydrogen burns with an almost viewless flame, and, owing to this fact and to its great heat, the blue aureole of the burning fire-damp is seen when the proportion of the latter present is only one-quarter per cent. The ordinary glass chimney is replaced by one

the cylinder. The tiller 4, as it is carried to port or starboard, slides through a socket 5, pivoted to 1. The rudder being moved, the motion is communicated to the steam cut-off by means of the shaft 3, crank 8, rod 9, crank 7, and the hollow valve spindle. When the tiller is amidships, the valve-handle 6 is at right angles to the cylinder and parallel to the tiller, while by moving 6 to the right or left, steam enters one or other end of the cylinder, which actuates the rudder by moving the tiller through the piston and crosshead. As soon as the rudder has attained its proper situation, the cut-off will have been moved the distance necessary to prevent the further admittance of steam. When the rudder is acted upon by the waves, or by the expansion and contraction of steam, the cut-off changes its position in reference to the valve, and of its own action arranges the steam-passages, so that the piston is returned to its proper place. It will be seen that the parts of this apparatus are few and



STEAM-STEERING APPARATUS.

of copper, in which an orifice is made; and a lens is adjusted at a proper focal distance to permit great accuracy of observation.

Fire-proof Ink.

A German chemical journal gives the following receipt for making an ink which will retain its colour under the action of fire:—To 850 grains of graphite or plumbago add 80 grains of copal varnish, 75 grains of copperas, and 300 grains of tincture of galls and indigo-carminé. Fire-proof paper, for valuable documents, may be made from one part vegetable fibre, two parts asbestos, $\frac{1}{10}$ part borax, and $\frac{9}{10}$ part alum.

Steering by Steam.

If the steam-tiller of which we give an engraving, and which is the invention of Mr. Herberth Wadsworth, Boston, U.S.A., be found to work efficiently under any circumstances, it is not improbable that it may be adopted on all vessels where steam can be readily provided, or where other patent steering apparatus is not already in use. The machine is furnished with a cylinder like that of a steam-engine, and a piston, the rod of which is fastened to a crosshead 1, that runs on ways 2, attached to the bed supporting

simple, and yet by balancing the valves and suiting the diameter of the cylinder to the work to be done, it is possible to overcome great resistance by a slight effort.

How to Make Court Plaister.

Considering how easily court plaister can be made, and how often it may be wanted at times when it cannot readily be purchased, there is really no reason why every family should not have a supply on hand for any emergency. Let some isinglass be soaked in a little warm water for seventy-four hours, and then evaporate the water by gentle heat, dissolve the residue in a little proof spirits of wine, and strain the whole through a piece of open linen. When cool, the strained matter should be a stiff jelly. Next, stretch a piece of silk or sarcenet on a wooden frame, fastening it down tightly by tacks, melt the jelly, and apply it to the silk thinly and evenly with a hair brush. After the first coating has dried, a second one must be applied; and when this latter shall have dried, the whole surface must receive two or three coatings of balsam of Peru. It is not necessary to use black silk, and should there be any objection to using so conspicuous a plaister, any other colour, for instance flesh-colour, will serve the purpose equally well.