

## THE GATHERER.\*

### A Telegraph Lamp-Post.

The city of Temesvar, in the South of Hungary, which has a population of 36,000, has had its streets lighted by electricity on the incandescent system. There are 731 glow-lamps employed in this work, and these are mounted, some on ornamental brackets attached to the walls of the houses, others on posts like that illustrated, which serve equally for carrying telegraph wires. The telegraph insulators are carried by short curving brackets at the top of the pole, and the lamps in glass lanterns as in the engraving, where two glow-lamps are visible inside the lantern. The post is of cast-iron, and the wires run up inside it to the lantern. A reflector having its under side of enamelled iron covers the lantern, and being in the form of a hollow flat cone, throws the light of the lamps down on the pavement



below. The lamps are of the Lane-Fox type, and are each placed at an angle of  $45^\circ$  to the vertical.

### A Shell with Eyes.

Professor Moseley has announced the interesting discovery that the shells of the *Chitonidæ* are endowed with eyes. No other mollusca appear to have any sense-organs in their shells. In some of the *Chitonidæ* as many as 11,000 eyes have been counted. Each eye has a calcareous cornea or bicornea, a lens of soft tissue, with a retina like that of the common snail. New eyes are constantly being formed at the edge of the shell as the latter grows. Besides eyes, there are organs of touch throughout the shell, each organ being capable of protruding at the surface through pores in the shell.

### Purifying Water by Air.

Water is now being purified at Philadelphia by mixing air with it under pressure. The process is due to Dr. A. R. Leeds, and the pressure assists the absorption of oxygen by the water and its consequent purification. At Philadelphia a Fairmount turbine has been transformed into an air-pump, which forces 20 per cent. of free air into the water-main, or, in other words, sufficient to surcharge the water. Analysis

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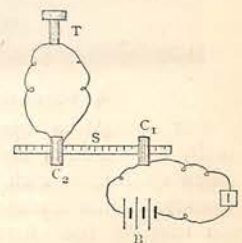
shows that the quantity of free oxygen in the aerated water is 17 per cent. greater than before aeration, while the quantity of carbonic acid is 53 per cent. greater, and the total of dissolved gases 16 per cent. greater. The percentage of free ammonia is diminished to one-fifth of its former amount. The results are held to show that aeration is quite practicable as a successful means of reducing the percentage of organic impurities in water.

### New Grottoes.

The Fish River Caves near Sydney, in Australia, are among the most remarkable limestone grottoes in the world, and take rank with the Mammoth Cave of Kentucky, and the Luray Cavern in Virginia. The Fish River Caves, which have been recently explored, are remarkable for a kind of filigree glass-work and stalactite drapery, which hangs like arras from the walls and roofs. In one part of the cave a pond of clear water was found, "its bottom glistening with pearls and other concretionary forms like nodules, marbles, birds' eggs, &c., interspersed with patches of diminutive coral forms." In the Shawl Cave there are curtains from ten to twenty feet long, some nearly white, others beautifully striped with pink, yellow, and brown. A fresh grotto has also been discovered quite recently at Dorgali, in Sardinia. The grotto commences with a large hall with sixteen columns rising from the alabaster floor, and apparently sustaining the pure white roof, which is wreathed and festooned with flowers and figures of animals in limestone. The most wonderful thing in the hall was, however, the petrified skeleton of a majestic stag, which was partly destroyed by visitors, and the spine of which has been sent entire to a professor of natural history in Cagliari. The grotto consists of six other large chambers full of natural curiosities.

### A Test for Hearing.

To the testing instruments already in use in the United States, one for testing the hearing has been added by Professor Grahame Bell, inventor of the telephone. Professor Bell's instrument consists of a telephone and an arrangement of two coils with a battery and a rotating current interrupter, which causes the telephone to emit a musical note of a definite pitch and loudness. The loudness of this note is diminished while the person whose hearing is to be tested listens at the telephone. This diminution is effected by drawing the coils apart, and the distance as indicated on a scale is a measure of the intensity of the sound. When the person can no longer hear, the number on the scale

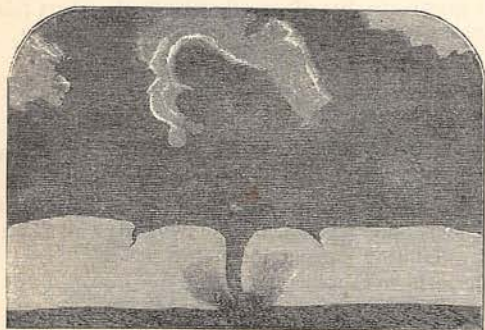




gives the acuteness of his hearing. Judging from the somewhat imperfect description of the apparatus which has reached us, we should say that the telephone was in circuit with one coil, and the battery and interrupter in circuit with the other; the note being excited in the telephone by induction between the two coils, and diminishing in loudness as they are separated. Thus, in the accompanying figure, if  $S$  be the graduated scale, and  $C_1$  a coil in circuit with the battery  $B$  and an interrupter  $I$ , the induction of the intermittent current in  $C_1$  upon the other coil  $C_2$  will evoke a musical note in the telephone  $T$ , and the loudness of this note will diminish as the distance between the coils  $C_1$  and  $C_2$  is increased. A properly graduated scale will therefore form a measure of the acuteness of hearing. The arrangement is almost the same as that devised by Professor Hughes, discoverer of the microphone, who measured the Prince of Wales' hearing with it some years ago. It was called by him the "audiometer," and was duly chronicled in the GATHERER of that day. Professor Bell has obtained some useful results with the apparatus: for example, he finds that about 10 per cent. of the children in the New York schools have slight defects of hearing, and about 1 per cent. are what may be called "deaf."

#### A Four-footed Bird.

An American naturalist, Mr. E. M. Brigham, has announced the discovery of a four-footed bird on the Anabiju river, in the island of Marajo, at the mouth of the Amazon. Curiously enough the bird (*Opisthocomia cristata*) is four-footed only in early life, and after a few days one pair of legs develop into wings. The bird resembles a pheasant, and frequents the beds of "aninga," a semi-aquatic aroid with large leaves, which grows in dense masses in the low, flat, muddy margins of the island. The "cigana" or gipsy, as it is called by the natives, builds its nest in the aninga, and rarely flies far from its peculiar haunt.



A Tornado Photographed.

Our illustration represents a cyclone, or more correctly a tornado of Dakotah, United States. It was taken on August 28th, last year, at Howard, Miner County, in that territory. The tornado passed over the town in the afternoon of that day, and killed several people, besides destroying all the property in its course. The lower line of the photograph represents the plain or prairie over which the storm passed,

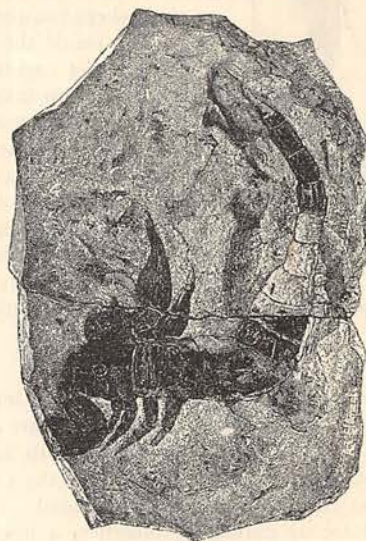
the upper dark mass is the cloud-belt accompanying it. The resemblance of the storm to a waterspout will be obvious to the reader.

#### Disinfecting Rooms.

Experiments have been made by a committee of French experts, including M. Pasteur, in order to ascertain the best means of disinfecting chambers in which cases of contagious affections have been lodged. The committee report that sulphurous acid gas is the best disinfectant; but recommend that instead of simply burning sulphur, as is done in barracks and such places, bisulphide of carbon should be burned in rooms, as it is less injurious to furniture or metals.

#### A Silurian Scorpion.

Last summer, in the Swedish island of Gothland, Professor Gustav Lindstrom, of Stockholm, discovered a fossil specimen of a scorpion in the Silurian rocks there. Our illustration shows this remarkable dis-

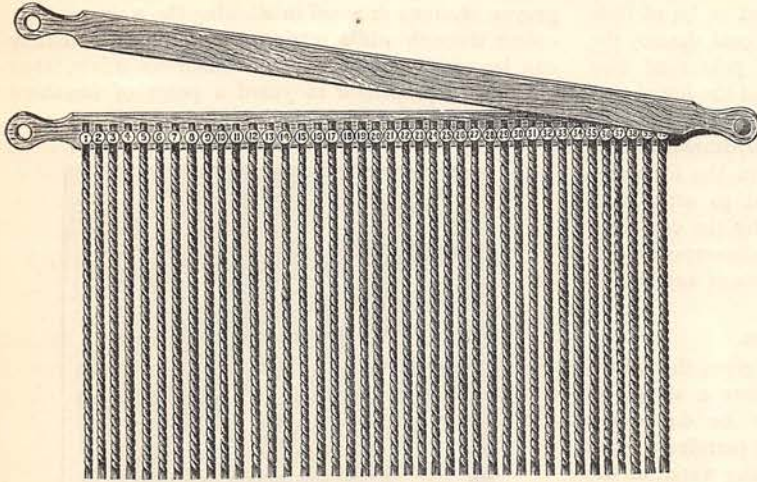


covery, which proves the existence of air-breathing land animals in that remote geological part. The scorpion is of a lower organisation than fossil forms of the same animal previously found in the Carboniferous rocks, or than those of more recent times. Its most peculiar feature is perhaps the four pairs of pointed feet, which jut out from the throat, a feature which is wanting in later scorpions. It is somewhat curious that Dr. Hunter, of Carlisle, a Scottish geologist, also found a fossil Silurian scorpion in the Upper Silurian rocks of Lesmahagow, Lanarkshire, in 1883, but did not realise its full importance until after the more recent discovery of Professor Lindstrom. It resembles that of the Swedish rocks in general aspect, but is about half the size of the latter. A fossil beetle has also been found quite lately in the Silurian sandstone of Calvados, in France, thus furnishing more evidence of the existence of air-breathing land animals in Silurian times, and, perhaps, answering for us the question—What did the scorpions find to prey upon?



### A Test of Colour-Blindness.

Dr. William Thomson, who originated the system now adopted by the Pennsylvania Railway Company for testing the eyesight of their servants employed



on the line, has devised the simple appliance which we illustrate for testing the eyesight and detecting colour-blindness. It consists of a rod or frame of wood having a fringe of 40 hanks of coloured wool depending from it. These test-colours are green, rose, and red. The hanks from No. 1 to 20 are for green, from 21 to 30 rose, and from 31 to 40 red. Within these colour-zones it is the *odd*-numbered hanks which are green, rose, or red, the *even*-numbered hanks being what are called "confusion colours"—that is, colours placed there to confuse the sight of the person being examined. Thus, "rose" makes a good confusion colour, being composed of red and blue in equal quantities. It appears as a tint of blue to the red-blind. In using the "colour-stick," a green skein is placed before the person at a few feet distant, and he is told to select those of that colour on the stick and throw them over it. The same process is gone through with the rose and red zones. This is done for every hank of wool, and the numbers are examined and recorded on a blank form. The testing is usually done by the divisional superintendent of the line, and he has but to remember that only *odd* numbers must appear on the blanks, since even numbers mean the selection of "confusion colours." When an employé is reported against in this way, he is further examined by the medical expert of the line, and if the defect is such as to be likely to lead to accidents, or interfere with his particular work, he is, if possible, accommodated with another post where the defect will not spoil his working capability.

### Drawing Wire from Fluid Steel.

Wires and bars are now produced direct from fluid steel by pressing it out through dies in a manner similar to the production of lead pipes from lead. An iron vessel, lined with refractory material, is provided

with a man-hole and a cover at the top, and securely closed. At the bottom opposite the man-hole there is a cast-iron outlet pipe, through which passes a steel tube with water circulating round it exactly like a "tuyere," by which the steel pipe or die can be cooled. The inner end of the steel tube is lined with fire-clay, where the very hot fluid steel meets it. The tube is plugged up by a steel stopper, and the liquid steel is filled into the vessel with liquid carbon dioxide above it. The stopper being withdrawn, the liquid steel is forced out by pressure of the carbon dioxide in a red-hot rod or wire, which goes from the vessel into the rolling-mill while still hot, and is there finished off. We may also add that steel is now produced direct from the ore by a new process of a French engineer. The ore in a powdered condition is submitted to the action of carbonic oxide gas at a high temperature in a cupola or blast

furnace, where it is reduced by the incandescent gas to pure iron or steel.

### A New Tool for Gardeners.

In tying up plants at a height which cannot be reached by the hands there is often considerable difficulty in holding the cord.

To obviate this an American inventor has patented the new tool which we illustrate. The centre-piece is T-shaped, and its upright may be of any length, or even jointed like a fishing-rod. At the end of each arm of the cross-head of the centre-piece are projecting rods of about the same length as the cross-head, and inclined upwards at a slight angle. Slight spring clips are attached to the points of the cross-head and the two projecting rods, all opening inwards. The cord, having been tied in a running noose, is secured by the clips and passed round the plant at the desired point by means of the tool, and, on being pulled, escapes from the clips and draws the parts of the plant together. The object of the clips is to hold the cord in its extended position, that it may be passed round the plant.





### Spontaneous Combustion of Coal.

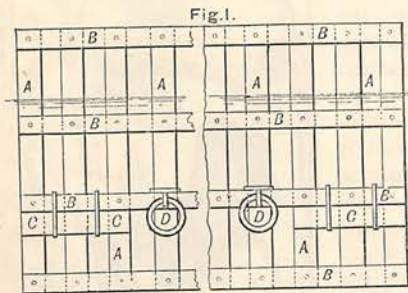
A number of fires have recently broken out in America in stores of bituminous coal by spontaneous combustion. The fires originated at wooden pillars sunk in the coal, which had been stored about five months. Electric fire-alarms are said to be of little use, as the corrosive liquids in the coal destroy the wire connections. Pointed rods or pokers of iron thrust into the coal are used to find out the hot places. To prevent the evil, it is proposed to saturate the coal from time to time with water from hydrants, and to make the bottom of the store-place in the form of a basin. The combustion is believed to arise from absorption of the oxygen of the air by the coal-dust, or, when the coal is damp, from the decomposition of iron pyrites and the organic compounds of sulphur.

### A Test for Petroleum.

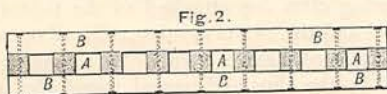
Herr Montag, a German chemist, gives the following simple test for ascertaining whether a sample of petroleum is sufficiently volatile to be dangerous. Fill a glass three-parts full with the petroleum to be tested, and fill up the glass with boiling water, at the same time holding a flame over it. If the vapour disengaged becomes ignited, the petroleum should not be considered a safe liquid to leave exposed to the air.

### A New Floating Breakwater.

The value of floating breakwaters to afford harbours of refuge and shelters for our numerous coasting craft, to protect engineering works and bathing-places, is becoming more and more manifest. One of the simplest of these breakwaters is that shown in our illustrations. It consists of large timber frames anchored in the water in single, double, or treble lines, so as



to act as a fence and break the force of the waves. Fig. 1 shows part of the length of one of these frames, A A being the upright, and B the horizontal baulks of timber composing them. Rings are provided for anchoring the frames, and strengthening pieces, C C, are



added at certain points. Fig. 2 is a section through the frame. These floating frames can be laid down on any part of a coast, and taken up again if need be. They can be made either of timber or tubular metal,

and readily adapted to the exigencies of the locality. While upon this subject, we may mention the iron frames or groynes introduced by Mr. Dowson at St. Anne's, Blackpool, and at Brighton for protecting the foreshore. These frames differ from the ordinary solid groyne of stone or wood in allowing the water to percolate through while retaining the shingle, and they can be readily put down and taken up again, thus enabling a proprietor to guard a point of foreshore in stormy weather.



### A Step-Ladder Easel.

Our figure shows a combined step-ladder and easel which will prove serviceable in many homes. The steps are made of different woods according to taste, and either bare or covered with plush or velvet. The height of the steps is six feet, and they fold up in a compact manner.

### Magnetising the Lodestone.

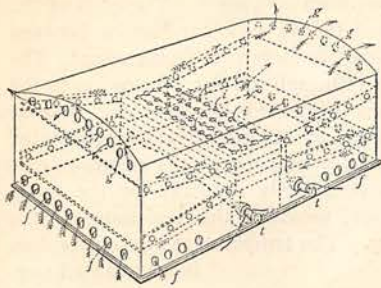
Dr. Antonio Paccinotti, the inventor of the Paccinotti dynamo, which preceded the better-known Gramme machine, has recently made a number of experiments to increase the magnetic power of natural lodestone, by artificially magnetising it like steel between the poles of a powerful electro-magnet. Dr. Paccinotti finds that small-grained lodestone can be magnetised in this way until its magnetic power is equal, if not superior, to that of the best hard steel. Lodestone is the magnetic oxide of iron, as is well known, and that used by Dr. Paccinotti was obtained from Elbe Island. He proposes to use magnetised lodestone for the poles of small dynamos, good hard steel magnets being more expensive.

### An Electric Foot-Warmer.

The accompanying figure is a sketch of a foot-warmer proposed by a well-known inventor, and re-



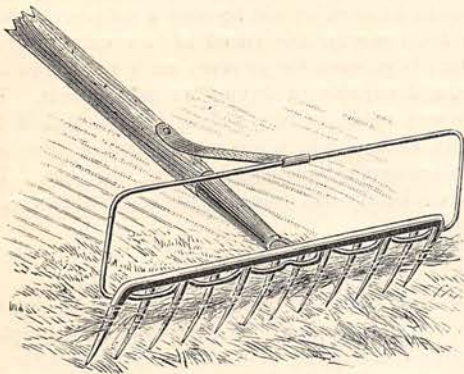
cently adapted for his own private use as a bed-warmer. It consists of a large metal box or hot-air chamber, perforated with air-holes, *g g* and *f f*, the latter being inlet and the former outlet holes. In the middle of this box is a smaller one, consisting of a block of fire-clay perforated with holes, *i i*.



These holes contain coils of bare wire connected to the outside terminals, *t t*, by which the electric current is sent through them. The current, by a well-known law, heats the coils of wire, and thus the air circulating through them in the direction of the arrows is warmed up, and escapes by the outlet-holes *g g*. The whole box is placed in the bottom of the railway carriage, and the feet can be rested upon it. The inventor also proposes to heat up acetate of soda in metal cases by this plan; the acetate retains its heat for an exceptionally long time, and serves very well for this purpose. The fire-clay heater can be applied to ordinary ventilators in chambers to heat the cold air entering a room, and it can also be fitted into a bed-room stove. When electricity is supplied to houses and railway carriages for lighting purposes, such devices may prove serviceable.

**A Self-Cleaning Garden Rake.**

The garden rake shown in the accompanying illustration is provided with a cleaning frame of bent wire,



attached to the head of the rake by means of a spring, which keeps the frame away from the teeth while the rake is in use. The frame can readily be pressed down over the teeth, which it clears at once while passing over them.

**Quicksilver and Phylloxera.**

San Francisco journals report the discovery that quicksilver triturated with clay in equal weights, and placed in the hole where a vine is planted, will pre-

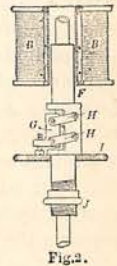
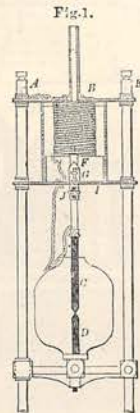
vent the attacks of phylloxera. Half an ounce of quicksilver to each vine is the proportion recommended. The clay should be free from grittiness. Trials made on vines already affected by phylloxera are said to have been very successful.

**Asbestos Hat-Linings.**

Hats are now being made in the United States with an asbestos lining to the crown. Asbestos is so well known as a non-conductor of heat that the advantage of its use for this purpose will be readily seen.

**A New Arc Lamp.**

The arc lamp which we illustrate is the invention of Mr. F. M. Rogers, and its action is based on the well-known "parallel ruler" used by draughtsmen. Fig. 1 shows the general form of the lamp, and Fig. 2 the details of the ruler device. The current enters by the terminal A (Fig. 1), and after passing through the solenoid or hollow coil of copper wire B, traverses the upper carbon C and the lower carbon D, then leaves the lamp by the terminal E. A core of soft iron F, carrying the stem or holder of the upper carbon C, is pulled up into the hollow of the solenoid, and lifting the upper carbon with it, makes the arc and starts the light. Near its lower end the core F is formed square, and one-half of it, G, is cut out, but attached to the rest by four straight links H, two of which are shown in Fig. 2. When the core is lifted by the current, the linked half, G, drops down upon the stem and clips it securely, thereby holding the latter in its place. When, however, the arc lengthens, and the current is weakened in the solenoid, the core drops, and the clutch G, touching the plate I, releases the stem and shortens the arc. The lower end of the core is fitted with a screw-nut J, by which the normal length of the arc is adjusted. The clutch G, having a considerable gripping surface, acts as a brake upon the stem without scoring it. This ingenious clutch is applicable to most electric lamps with a little modification in them. The new lamp has been successfully used for colour-testing and photography, its simple action making it easily managed.



**A Simple "Magic Mirror."**

The magic mirror of Japan is a metal mirror which, on being looked into, discovers in a quasi-magical kind of way the presence of figures and mottoes, though all the surface appears equally bright. Various theories have been advanced to account for them; but the latest is that the figures are due to a difference of



density in the metal, caused by hammering. Thus Dr. Muraoka, of Tokio, recently took a half-crown piece and rubbed down one surface till it was smooth and polished. The reflection of a strong light from it on a white paper screen then showed the outline of the figure on the other side of the coin. The real magic mirrors of Japan also have on the back the figures and mottoes which are seen on the face.

#### A New Light for Spectrum Analysis.

The electric light is now so generally used for spectrum analysis, that there is some novelty in a light sufficiently good for the purpose which is produced without the aid of electricity. Such a light was shown recently by Mr. E. Clemenshaw at a meeting of the Physical Society of London. A small quantity of the salt to be examined by the spectroscope is put into a flask, in which hydrogen is being evolved by the action of zinc upon dilute hydrochloric or sulphuric acid. The flask is provided with three necks, one being fitted with an acid funnel, one with a jet, and by the other is introduced a current of coal-gas, or, better still, of hydrogen, by which the size of the flame can be increased and regulated. The jet, which is about  $\frac{1}{8}$ -inch in diameter, is surrounded by a larger tube, by which oxygen is admitted to the flame. The result is a brilliant oxy-hydrogen light, giving the spectrum of the salt, which is carried up mechanically by the evolved hydrogen. Mr. Clemenshaw exhibited to the meeting the spectra of sodium, lithium, and strontium obtained in this manner.

#### A Travelling Chair.

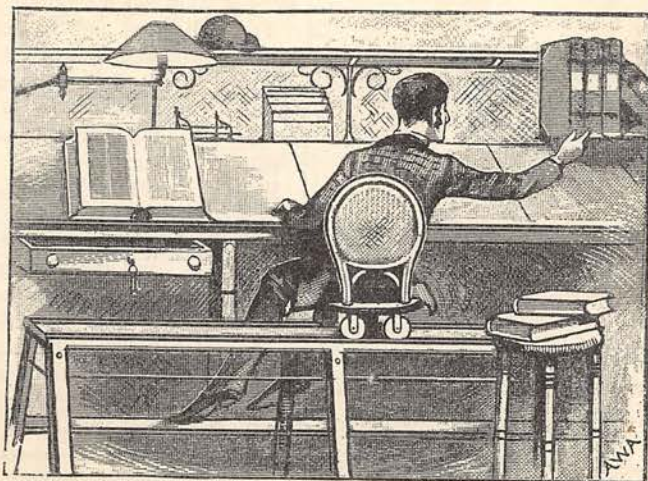
An American inventor has taken pity on the book-keepers and clerks whose duties compel them to make frequent changes from one book to another at the same desk. He has devised for them a chair running on a kind of miniature tramway, in such a manner that a push of the foot upon the foot-board will move the chair to right or left as may be desired. This enables the worker to move from one book to another with greater ease, and far less confusion than is occasioned by the getting down from his seat and into it again.

#### A New Voltmeter.

Captain Cardew, R.E., has devised a very simple voltmeter for measuring the electro-motive force or

"pressure" used in electric lighting. It consists essentially of a very fine wire of platinum-silver alloy, .0025 inch in diameter, enclosed in a brass tube to prevent air currents from striking it. The ends of the wire are connected to the two conductors between which the electro-motive force is to be measured. The current which flows through the fine wire owing to the electro-motive force in question heats it, and the wire expands in consequence. This expansion is indicated on a dial, and forms a measure of the electro-motive force, since it is necessarily constant for the same electro-motive force, provided the resistance of the wire does not vary. The temperature of the wire does

indeed cause its resistance to vary, but under ordinary circumstances, and with platinum-silver wire, this variation may be neglected. Platinum silver alloy only increases .035 per cent. in its resistance with a rise of temperature of 1° Centigrade.



A TRAVELLING CHAIR.

and the weight 83 tons, while the velocity of the rim as it turns in working will be over a mile per minute, or in other words, the speed of an express train. The face is grooved for 32 ropes, each  $1\frac{1}{4}$  inch in diameter, and capable of driving 40 horse-power. The pulley was made in fifty pieces, and comprises two sections, each of which has a boss, twelve arms and twelve segments, bolted and keyed together. The ropes conjointly will transmit an aggregate of 1,280 horse-power.

#### Miniature Music.

Miniature rolls of music, forming vest-pocket books, are now produced by the aid of photography; and quite recently the plan was adopted of fitting to violins a small card of the piece to be played, by means of a spring clip, on the left-hand side of each instrument near the neck of the player, and out of the way of the left hand and the bow. The commercial gelatine-bromide of silver paper is used in taking the copy by the help of a camera.

1884 GAVOTTE COMPETITION.—*The Editor hopes to publish the Award in this Competition in the next issue.*