parents remaining at home in dignified idleness. Here is a case, the correctness of which is vouched for by the secretary to a ragged school. A child of six was daily sent out by his parents to sell matches. Unless he brought back at least eightpence by 10 p.m., he was severely beaten for his presumed laziness, and then turned out to spend the night in the streets. The child was twice taken up by the police, and sent to Homerton Union. But on each occasion he was at once claimed by his anxious relatives, who had no wish to lose their son and slave. Is this a solitary instance? Far from it; it is only one of many, and very far from the most brutal or revolting.

Children are often tutored to assist the imposture of their parents. A notable instance of this may, perhaps, be familiar to some; but it will bear repetition. A lady, well known in London for her interest in the poor, had been helping a family, the husband of which was ill. One morning the little girl came with the message—

"Please, ma'am, mother says father's dead; and would you please come and see her?"

Although a little surprised at the unlooked-for end of the sickness, the lady speedily set out for the house of mourning. Toiling up-stairs to the room, she found the man laid out as dead, and the mother in tears with the family around her. She sat down, and ministered consolation to the widow. Finally, she laid down two sovereigns as a contribution towards the funeral expenses, and then retired. At the bottom of the stairs, the visitor remembered that she had left her umbrella above. She quickly ran up again, and entered the room without knocking. Imagine her surprise at beholding the *pseudo*-dead man sitting up in bed, and tossing the sovereigns through the air from one hand to another with the dexterity of a juggler! Now, in this little comedy the children had a not unimportant part to play; and they seem to have filled it with success. If they, in future life, turn out accomplished rogues, can we marvel thereat? What wonder if the children who are early brought up to lie and steal for others, early learn to lie and steal for themselves? And what wonder if their mature years fulfil the evil promise of their childhood?

Is there any remedy for this? There is, perhaps, a partial remedy in our hands. Let us beware of indiscriminate charity. To give money to men and women who drag a group of half-starved children through the streets is putting a premium on vice, subsidising hypocrisy, and depriving the honest poor of their due. Experience tells the householder that food offered to such is sometimes rejected, sometimes taken and then thrown away. Money is what they want—money to provide a juicy steak for the evening meal, money to procure a night's carouse afterwards. To obtain that, they care little if the children perish body and soul. Children are cheap enough, although this is England. A penny for the poor man out of work, and for his starving family! Happy, thrice happy, in comparison with their victims, are those children whose early misdeeds or misfortunes have brought them to an industrial school or a similar institution. Bright futures are in most cases before them, whilst thousands of children, whose misfortune it is to escape the hand of the law, linger on in hopeless poverty and woe.

A. R. BUCKLAND, B.A.

THE GATHERER.

A Locomotive Gas-Engine.

A locomotive emitting neither smoke, sparks, nor cinders, was recently tried on the Erie Railway in the United States. The power was derived from the ignition of hydrogen gas, after the manner of a gas-engine; and the hydrogen was produced by the chemical decomposition of water by means of burning naphtha. In this way a very high speed was maintained throughout the trip, at a cost of one-third that of coal burned in an ordinary locomotive. The advantage of such an engine in city railways is obvious.

New Life-saving Sea-Anchor.

This most important invention was exhibited at the late exhibition of life-saving appliances at the Alexandra Palace. It is intended to enable disabled vessels to ride out heavy gales and storms, and for other similar purposes. It will be seen from Fig. 1 to consist of an oblong raft, which may be made either of well-seasoned wood carefully caulked, or of iron or steel possessing sufficient buoyancy to enable it to support the stout steel-wire towing hawser in front, and the series of chain-connected canvas bags or "drogues" behind. The front of the raft carries, in addition to eye-bolts for the secure attachment of the towing hawser, a strongly-hinged flap, which, when the

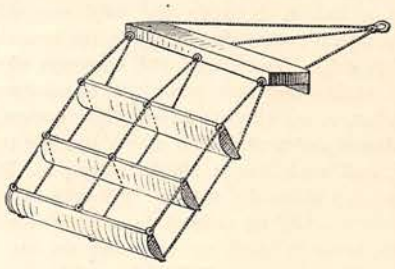


FIG. 1.

anchor is in use, drops perpendicularly into the water, thus giving an increased resisting force in dragging. The bags are made of stout canvas of the same length and breadth as the raft, and are kept extended by a bar-iron rim at the mouth of each bag, and are further

stiffened by a cross-bar of iron at the centre of each. These bars are connected with one another by short steel-iron pendants and shackles, and finally the bags are secured by means of shackles and steel-wire pen-

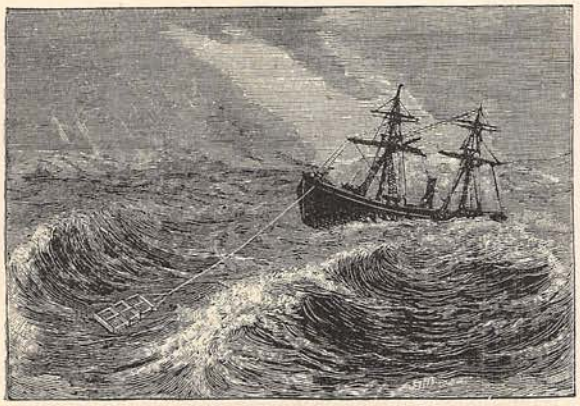


FIG. 2.

dants to eye-bolts fixed at the back of the raft. Fig. 2 shows the sea-anchor in use. Of course by varying the size of the raft and bags different degrees of resisting force can be obtained, and thus the requirements of any sized vessels may be very easily met. When not in use the bags can be lashed to the raft, and as then the whole apparatus takes up but very little room, it can be secured to the bulwarks outside the bow of the vessel, and therefore ready for immediate use. The resistance offered by the raft and bags is, as a rule, kept as nearly as possible in equal ratio to the resistance offered by the vessel to which it is supplied by being towed at varying speeds. By this means a disabled vessel in a heavy gale is enabled to "lay out ahead" a sea-anchor, that exercises the same power in holding her head to sea as a powerful tug would do.

A New Cotton-Plant.

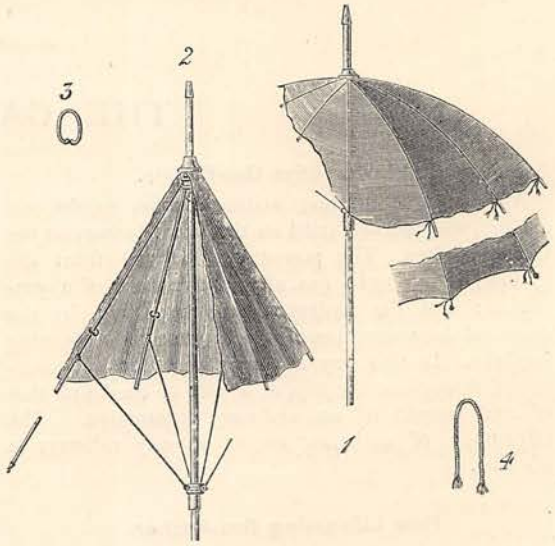
A new kind of cotton-plant is now attracting much attention in Georgia, and bids fair to prove of great value. It is the result of a long series of experiments, and is a hybrid between the wild cotton-plant of Florida, which grows abundantly in the swamps of the Caloosahatchie River, and the common okra. The hybrid retains the okra stalk and the foliage of the cotton, but is strikingly unlike either cotton or okra in its flower and fruit. The plants average two feet in height, and each has a single bloom as large and fragrant as a magnolia flower. Like the cotton bloom the flower is white for several days after opening, then changes through pink to red, and droops off, disclosing a large boll resembling that of the cotton-plant. For ten days the boll keeps about the same size, and then suddenly swells, as if by magic, until it reaches the size of a cocoanut. The fluff then begins to appear and burst from the boll. One experienced picker is said to gather as much as 800 pounds per day, and fast hands a good deal more.

Preventing Scurvy.

From a recent report of the Board of Trade it appears that sea scurvy has been on the increase in the British Navy since 1873, and it is therefore of great importance to find a remedy for the disease. Lime-juice of itself does not seem to prevent it, and the report states that too much reliance is at present placed upon it. Indeed the dietary scale of ships ought to include a fair proportion of fresh and preserved meats as distinguished from salt meats : and more fresh vegetables, especially potatoes, should be carried by ships. The excellent health of Mr. Leigh Smith's men during their winter at Cape Horn, after the wreck of the *Eira*, is attributed by the doctor of the expedition to their having lived on the food of the country, namely seal, bear, and birds shot by the guns of the party, and he recommends future Arctic explorers to rely rather upon this and potted vegetables than on lime-juice.

Detachable Umbrella and Parasol Covers.

This is a neat and useful invention, permitting of an easily effected change of the cover of an umbrella or parasol, so that with a single frame a variety of colours may be used, thus enabling not only worn-out covers to be readily replaced, but also offering this special advantage of enabling ladies to provide themselves with parasol covers corresponding with each change of dress. The interchangeable covers are made to slip over the top of the stick of the frame, the

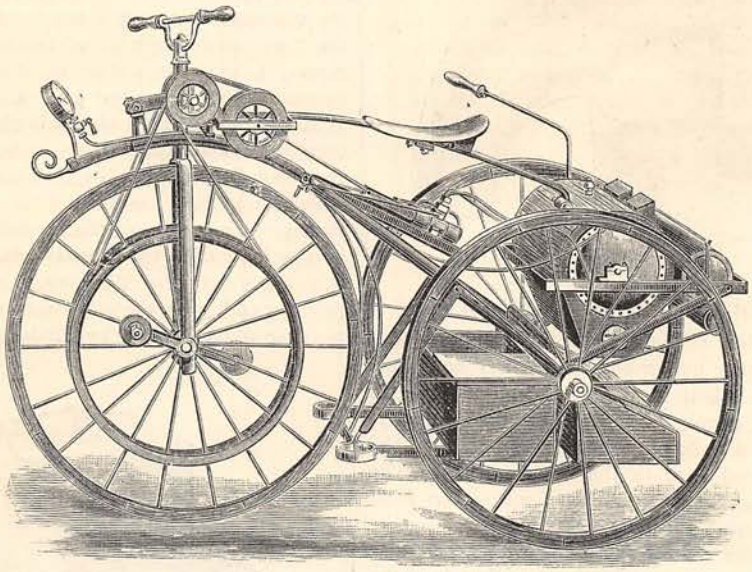


margins of the aperture in the cover being strengthened by a ring of leather. This ring fits down upon the notch-plate, and is held down by a rubber ring, which is sprung into place, and further secured by a metallic collar, carried by the umbrella-stick, as is shown in the illustration at Fig. 2. The ring of the cover is kept from turning upon the handle by means of short

shank points projecting from the runner. The cover is secured to the ribs either by means of strings or split rings (Figs. 3 and 4) sewed to its under-side, and made to pass through eyes or loops in the ribs, as shown in Figs. 1 and 2.

A Steam-Tricycle.

This novel vehicle is the invention of Mons. L. G. Perreaux, and consists of an ordinary tricycle combined with a small steam-engine and fuel chambers. The engine and accessories are supported mainly by the two hind wheels, as seen in the illustration; and the front wheel is used for a driving and guiding wheel. The steam is produced by the burning vapours of alcohol heating the boilers. The alcohol is warmed to give off its vapour better by means of a little spirit-lamp, whose power can be regulated by hand, so as to increase or diminish the production of heat under the boilers. The steam produced in the boilers is repassed through the spirit-flames in copper tubes, so as to superheat it before it passes into the cylinder of the motor. This adds to the economy of the machine, and there is little or no danger of explosion, as the pressure never exceeds four atmospheres, as can always be seen by referring to the manometer placed in front of the person riding. The motor is a little single-cylinder steam-engine, and its power is communicated to the front wheel by cords and pulleys. Steam is let off under the seat, and water is fed to the boiler by means of a little pump from a reservoir capable of keeping up a three hours' supply before being replenished. The rider has all the stopcocks and apparatus necessary for working the tricycle under his immediate command, and in this way he can traverse the country at a rate of fifteen to twenty miles an hour, with little or no expenditure of his own energy.



A STEAM-TRICYCLE.

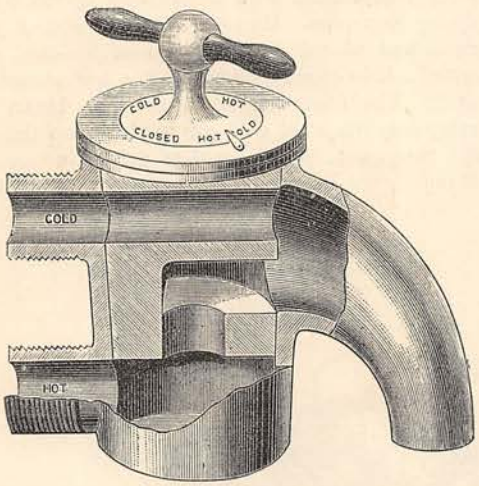
Flameless Combustion.

At a recent soirée of the Society of Chemical Industry at Owens College, Mr. Fletcher exhibited some curious experiments with a gas-flame given by an ordinary blow-pipe. He took a ball of iron of 3 lbs. weight, and placed it on a slab of fire-clay, then directed a blow-pipe flame on it for a few seconds to heat it. The flame was then suddenly blown out, leaving only the jet of cold gas to play upon the iron ball. Strange to say, instead of getting cooler, the ball rapidly got hotter, until it actually fused and ran in drops of molten metal, although no flame could be detected even in the dark. Again: a fire-clay crucible, such as is used for melting metal, was subjected to the jet of gas, and softened into a doughy mass. The supply of coal-gas was obtained from a quarter-inch gas-pipe, and was assisted by the ordinary air-blast from a bellows. The temperatures which can be obtained in this way are very high, and the plan is likely to be useful in chemical analyses, if not in metal-working.

An Electric Hammer.

An ingenious automatic hammer has been invented by M. Marcel Deprez, the well-known French electrician. It consists of two sets of coils of wire, or solenoids, an upper and a lower set. A soft iron rod works up and down in the hollow of the coils, and has a hammer-head attached to it. When an electric current is sent through the upper solenoids, the iron rod is pulled up and the hammer lifted; when the current is sent through the lower solenoids, the rod is pulled down and the hammer falls. By means of a self-acting current changer, or commutator, the current from a battery or a dynamo-electric machine is

shifted from one to the other set of solenoids alternately, and the hammer is thus worked up and down very rapidly.



New Hot and Cold Water Faucet.

This simple but efficient water faucet is so constructed that either hot or cold water may be drawn separately, or even both may be turned on at the same time. The plug, as may be seen from the accompanying illustration, is sealed in the tapering barrel of the faucet, and secured there in the ordinary way. The plug carries on its outer and upper surface an indication dial directing the user as to the proper turn to give the handle according to his wants, and also showing the exact position of the handle when the faucet is completely closed. The barrel is provided at one side with an inlet opening for hot and cold water, and at the opposite with a general delivery passage to the inner end of the discharge nozzle. The plug is made with a transverse connecting passage between the cold water inlet and nozzle, and it has also a passage having three terminal openings corresponding with the marks on the dial for the hot water.

An Electric Submarine Detector.

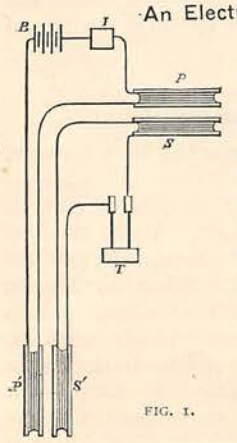


FIG. 1.

Captain McEvoy has devised an ingenious apparatus for detecting the presence of metal-cased torpedoes, sunken iron hulls of ships, lost telegraphic cables, anchors, chains, or other metal objects on the bottom of the sea or moored under water. The apparatus is an application of the induction balance of Professor Hughes, F.R.S., which we have already described in the GATHERER. The first suggestion of the practical use of the balance for detecting metal masses appears to have been made by Mr. J. Munro, who in 1880 described an arrangement adapted to find out metal veins in the ground. This arrangement, indeed, is substantially the same as that employed last year by Professor Bell to locate the lost bullet in President Garfield, and by Captain McEvoy in his detector. It will be readily understood from Fig. 1, where P S and P′ S′ are the four coils of wire of the induction balance arranged in pairs, separated from each other, and connected by insulated wires. The coils P and P′ are joined together through a battery, B, and a key or interrupter, I, thus constituting the primary circuit of the balance. The coils S and S′ are connected through a telephone, T, and constitute the "secondary" circuit of the balance. The interrupter, I, may be either manipulated by hand or automatically, so as to give a continuous action. Whenever the primary circuit is closed by its means a current traverses the primary coils, P P′, and induces a corresponding current in the secondary coils, S S′. This current is of course audible in the telephone, T; but by reversing one of the secondary coils, say S′, the current induced by the primary coil, P′, in the secondary, S′, is made to oppose the current induced by the other primary coil, P, in the other secondary, S, so that it is possible to cause these two induced currents to annul

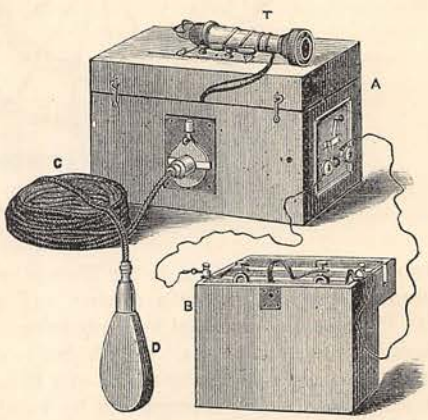


FIG. 2.

one another and produce silence in the telephone. In other words, it is possible to effect a practically perfect balance between the two induced currents. This is done by making the two primaries and the two secondaries alike in all respects, and placing the secondary, S, at the same distance from P that S′ is from P′. Fig. 2 represents the actual apparatus employed by Captain McEvoy. One pair of coils, P S, are contained in the box, A, together with a vibrating interrupter which makes and breaks the current from the battery, B, in the circuit of the two primary coils. The other pair of coils, P′ S′, are contained in a flat wooden flask or case, D, which is let down into the water to search for the hidden metal. The two primaries, P and P′, are connected by wires in circuit with the battery and interrupter; while the two

secondaries, S S′, are connected in circuit with the telephone, T. A flexible cable, C, carries the connecting wires inside it. The battery and box together with the telephone are of course carried in the explorer's boat, and the case is trailed behind in the water as the boat moves. Whenever the case comes against the sunken metal object, the person listening in the telephone hears a loud humming sound where all was silence or nearly silence just before, and knows that the case has touched a metal so as to upset the electric balance on the instrument. Captain McEvoy's apparatus is very sensitive, and it is to be tried at Chatham for finding torpedoes.

Tracing on Cloth.

Engineers and surveyors are frequently troubled with the excessive glaze on tracing cloth preventing the ink of their drawing pens from running. Pure ox-gall is sometimes used to mix with the ink to overcome the difficulty, but the following flux is preferred :—Filtered ox-gall, boiled and strained to keep back the scum, is heated over a fire, and powdered chalk added. When the effervescence ceases the mixture is again filtered, and a bright, colourless liquid is obtained. A drop or two of this added to the Indian ink makes it run on tracing cloth, and will also efface lead-pencil marks. When the tracings are to be heliographed, raw sienna is added to the ink, as this colour unites with it most intimately and intercepts the greatest quantity of light.

Soap Sheets.

Travellers, especially travellers on the Continent, are aware that the "Soap question" has often given rise to a good deal of annoyance. With a view to obviate such unpleasantness, an ingenious inventor has devised a very handy method of carrying soap. A little book—two and a half inches wide, by three and a half deep—that can be kept in the waistcoat pocket, contains forty glossy leaves, not unlike tracing paper. These leaves are coated with saponaceous matter, and each of them forms in itself enough soap for one ablution. When a "wash-up" is desired, all that is needed is to detach a leaf from the book, to wet it well, and then to rub it between the hands after the ordinary fashion.

A Rapid-view Instrument for Momentary Attitudes.

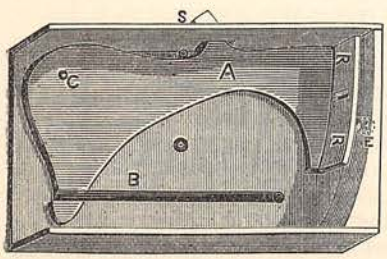


FIG. 1.

A highly novel and ingenious contrivance has lately been constructed by Mr. Francis Galton, by which, with the otherwise unassisted eye, brief glimpses of such rapidly-moving bodies as the wheel of a bicycle at full speed may be caught and impressed on the retina as a well-defined and apparently stationary object. The details of its construction may be

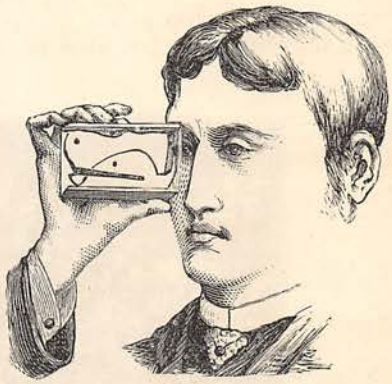


FIG. 2.

learned by reference to Fig. 1, where A is an arm that turns through a small angle round C, its motion being limited by two pins. Its free end carries a vertical screen, R R, which is a cylindrical (or better, a conical) sheet, described round an axis passing through C perpendicular to the arm. As the arm travels to and fro this screen passes closely in front of the end of the box, which is cut into a hollow cylinder (or cone) to correspond. There is a slit in the middle of the screen, and an eyehole in the centre of the end of the box. When the slit passes in front of the eyehole, and the instrument is held as in Fig. 2, a view is obtained. A stud, S (Fig. 1), projects upwards from the arm, and an india-rubber band B passing round a fixed pin, and a descending spoke of the arm, acts as a spring in causing the stud, S, to rise through a hole in the side of the box where the finger can press it. In using the instrument it is held in the hand, as in Fig. 2, with the eyehole in front of the eye. Nothing is then visible, but on pressing or tapping the stud the slit passes rapidly in front of the eyehole, and the view is obtained. After this the stud is released, and the arm springs backwards, when a second view can be obtained, or the eye may be purposely closed for the moment. The instrument may be covered with a sliding lid and carried in the pocket. Mr. Galton estimates that the practical duration of the exposure is about $\frac{1}{500}$th of a second, and it is rather less when the finger acts with a sharp tap in opposition to the spring.

A New Steam-Engine.

Professor Wellner, of Brunn, has invented a new steam-motor of a kind hitherto unknown, which has just been patented in Austria. It has been called a "steam-wheel," and the principle of its working consists in the difference in specific gravity between water and steam. The wheel itself is very similar to an ordinary mill-wheel, such as is worked by water-power, the floats being made with concave in place of

flat surfaces. This wheel is immersed in a vessel of hot water, into the lower part of which steam is admitted from a separate boiler, or it may be there generated by the direct application of heat beneath. As the steam is admitted, or generated, it fills the concave or cup-like under-surface of the floats while ascending, and carries them with it to the surface, thus causing the wheel to revolve, while the descending floats on the opposite side present only their convex surfaces to the ascending vapour, thus offering but little resistance to its ascent. As the cells rise the steam is discharged at the surface of the water, and may be led either into the air, or into an appropriate condenser. The simplicity of this "steam-wheel" is its principal recommendation, although it is said that a wheel of moderate size is capable of developing considerable power. For small wheels, for light work, the waste steam from any ordinary steam-engine or other source may be utilised, the rapidity with which the wheel revolves being of course in proportion to the volume of steam admitted, though the number of revolutions per minute may be increased by the addition of a band or multiplying cog-wheels, just as is done in the case of ordinary stream water-wheels.

A Travelling Plant.

A plant which has the curious habit of wandering from place to place, or rather propagating itself by bending its branches to the ground and taking root in a fresh place, is reported from Kashmir by M. Ermens, Director of Agriculture to the Maharajah of that province. It is the *Adiantum Edwarthi*, and it grows abundantly at Jummoo, sixty miles from Sealkote, in the Punjab. It affects moist parts, and flourishes best in the rainy season. A good idea of this vegetable curiosity is given in the engraving.

A TRAVELLING PLANT.

A Train Telegraph.

We have the electric light in running trains now; and quite recently a successful attempt was made in America to send and receive telegraph messages on a train in motion. This was done by means of a telegraph line laid along the track, but interrupted at every forty feet, and the ends of the break brought to blocks mounted on the middle of a sleeper. These blocks carried two metal rollers, to which the ends of the wire were connected, and when these rollers were depressed, they came apart and interrupted the line. When, on the other hand, they were in their normal position, they kept in contact, and the circuit through the line was unbroken. The depression of the rollers was effected by two metal strips or bars projecting from the bottom of the telegraph car attached to the train, and these bars were connected by wire to the telegraph apparatus inside the car. As the car passed over a pair of rollers, the bars below it pressed down the rollers, thus separating them and at the same time inserting the telegraph instruments on board in the circuit of the line. The clerk in the car could thus send or receive a message on the line, and as the next pair of rollers was always in contact with the bars before they had left the last pair, the circuit of the line and telegraph instruments was never entirely broken. The trial was made over 200 yards of the Charlotte and Atlanta Railway at a speed of 25 miles per hour, and messages were sent and received by the passengers in the train.