A NOVEL SMALL MOTOR.

A small, safe, and easily managed motor adapted to domestic use and suitable for driving small machinery of various kinds is one of the things that has long been wanted, and we are pleased to be able to present to our readers several engravings of a motor of this description which is made by reliable parties and is now being extensively introduced.

The Tyson motor possesses some novel features which are well worthy of careful examination. It is a steam engine with a non-explosive steam generator, and without a steam gauge, water gauge, or safety valve, and its boiler or generator has but one-fiftieth the cubical capacity of an ordinary boiler adapted to the same engine.

Fig. 6.—TYSON BRACKET ENGINE.

In the smaller sizes of these engines either gas, coal oil, or gasoline may be used as fuel, and for the larger sizes coal and wood may be added to the list.

The fact that this engine is perfectly safe, even in the hands of the inexperienced, is a great point in its favor. It may be run by any lady who is competent to operate a sewing machine. It is beautifully finished and may be placed in the parlor, sitting room, bed chamber, or kitchen, and may be employed in running sewing machines, knitting machines, ventilating fans, and all kinds of light machinery used about the house. It may also be used for running coffee mills, printing presses, dental lathes, in fact it may be applied to all machines usually driven by a treadle or hand. power.

The general appearance of this new motor is well represented in the central view in the larger engraving, while its application to small machinery is shown in the smaller views, Fig. 1 showing it in connection with a sewing machine, Fig. 2 shows a lathe, and Fig. 3 a scroll saw driven by it. Fig. 4 shows an application too obvious to need description, but it suggests the possibility of comfort in the sweltering days

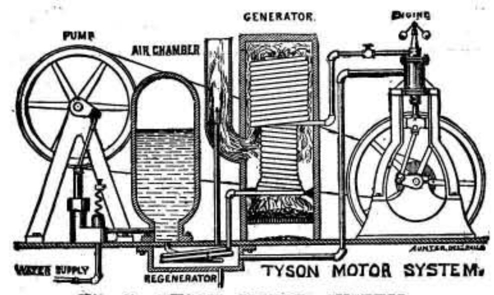


Fig. 7.—TYSON MOTOR SYSTEM.

of mid-summer. Of course the variety of machinery to which the motor may be applied is unlimited. The style of engine shown in the engraving has a power equivalent to 1,000 foot pounds per minute, and is quite sufficient for a great variety of purposes; but we are informed that larger sizes are soon to be made so as to cover a wider range of application.

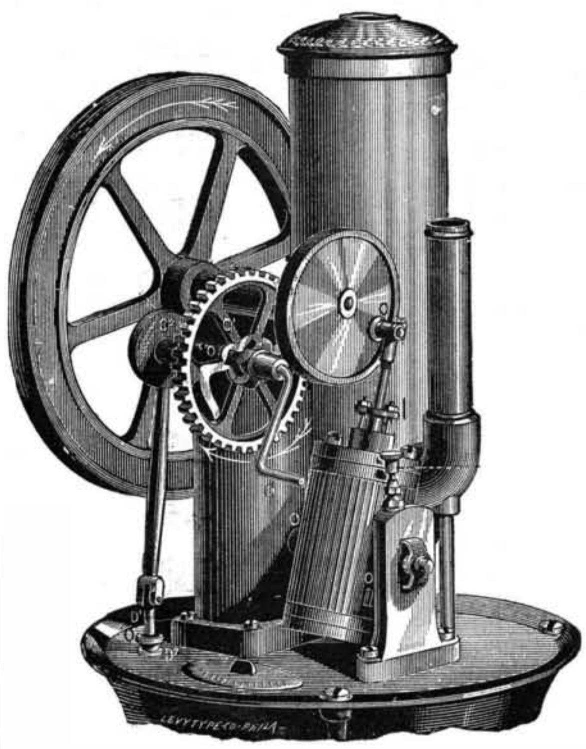


Fig. 5.—TOP OF TYSON MOTOR.

Fig. 5 is an enlarged view of the upper portion of the engine, showing the oscillating cylinder, the generator, and the pump. Figures 3 and 6 show the engine adapted to a wall bracket.

Fig. 7 shows the relation of the various parts of the engine, and illustrates the operation of the system. The pump is worked by hand to produce pressure in the air-chamber; this chamber is connected to the steam chest of the engine by means of a long pipe, part of which is coiled in a receptacle through which exhaust steam from the engine has egress, and part in a furnace. The water is converted* into steam, in its transit through this pipe, and steam is delivered to the engine at the pressure produced by the pump. When the engine is started it imparts motion to the pump, and the preinduced pressure is maintained; thus it will be seen that the function of the generator is to create volume, not pressure. Should the

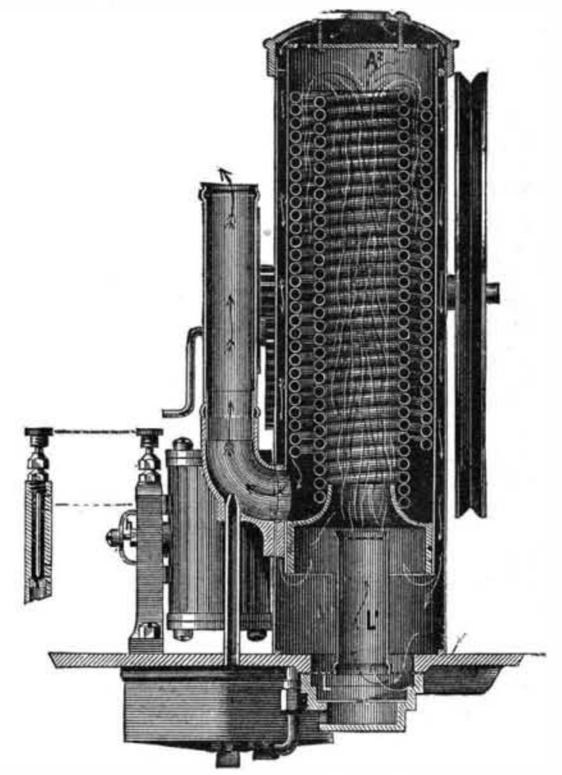
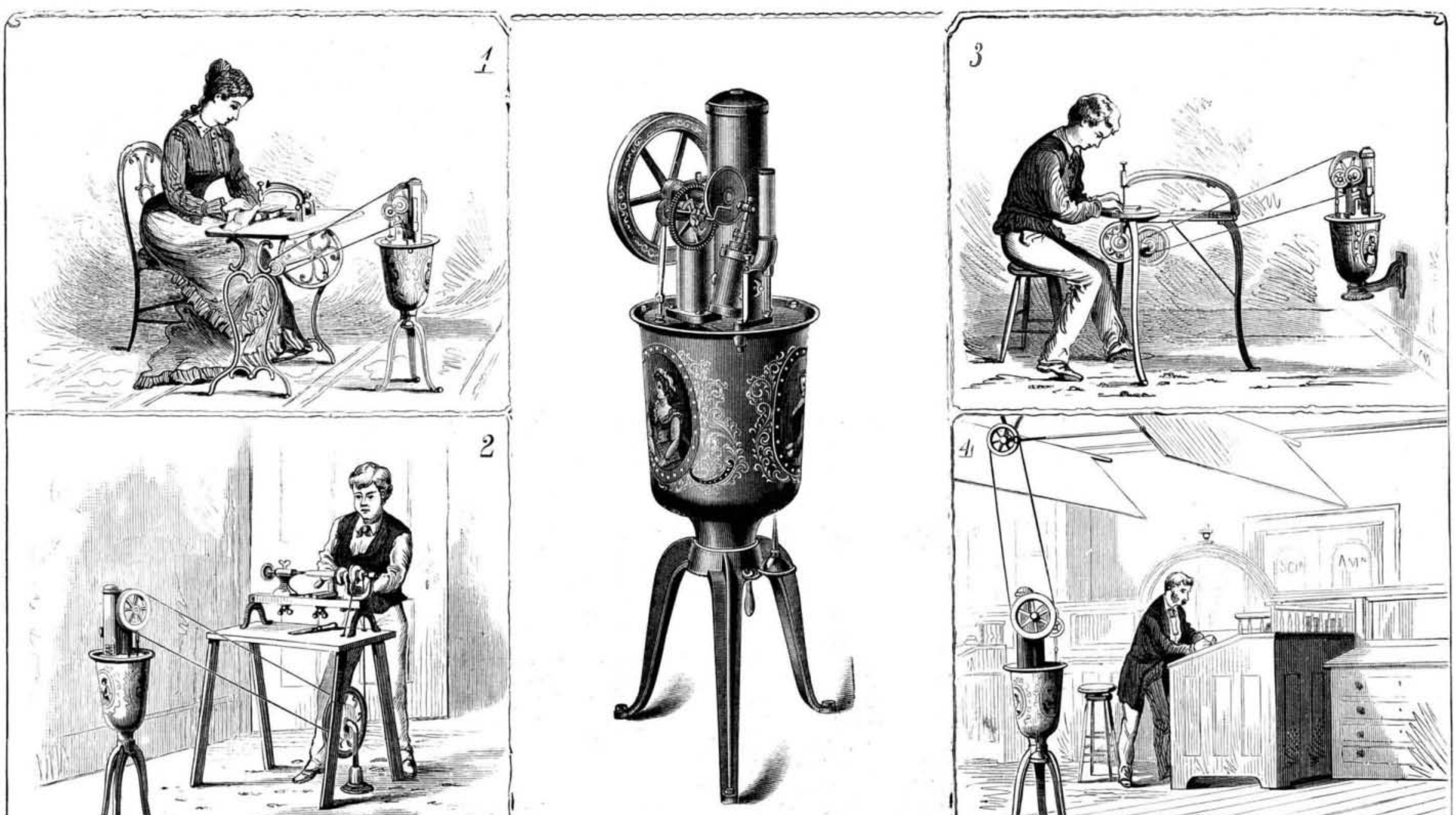


Fig. 8.—VERTICAL SECTION THROUGH GENERATOR.

engine be stopped and the fire continue to burn, the water in the coil is forced back to the air chamber, and the production of steam is thereby checked; the engine being again started, the pressure in the air chamber again forces water through the heated coil, and the generation of steam is resumed. In running these small machines about all that it is necessary to do is, to pour in a few quarts of water once in four or five hours. The construction is such that there can be no explosion even if the water becomes wholly exhausted. In that case the machine simply stops till water is supplied.

A relief valve at the right of pump limits the pressure; this valve is in no sense a safety valve, for even if it were

* The inventor states that in practice it is best to flash highly-heated water into steam.



THE TYSON SMALL MOTOR.

fixed so as not to yield to pressure, no explosion could occur —the mechanism of the pump not being strong enough to produce a bursting pressure.

This engine is the invention of Mr. Charles Tyson, of Philadelphia, and it is now being manufactured in handsome styles and introduced by the Tyson Engine Company, 1301 Buttonwood street, Philadelphia, Pa., to whom all letters should be addressed.

New Type of Torpedo Boats.

The torpedo boats used in the English Navy are of two kinds—those of the Lightning class measuring 84 feet in length and 100 feet 10 inches in beam; and those of the second-class, 60 feet long by 7 feet 6 inches broad. It has, however, been found from experience that first-class torpedo craft of the dimensions hitherto constructed are not sufficiently seaworthy to go out in any weather, and many governments are, in consequence, adopting a larger size. Messrs. Yarrow & Company, of Poplar, are at the present time engaged in building several of the new type of torpedo boats for various governments, including those of Russia and the Argentine Republic. They are 100 feet in length by 12½ beam, and are intended to be capable of going to sea under all conditions of weather unattended by other vessels. Their fuel carrying capacity will be sufficient for a run of 1,000 miles. They are also built much stronger and heavier than has been hitherto the practice, and are expected to realize a speed of 19 knots.

New Steam Frigate.—The Largest in the World.

The following from the *Mechanics' Magazine* of about forty years since affords an interesting comparison with the dimensions of ships of to-day: "The Admiralty have given instructions for the building and equipment of a new steam frigate, which is to surpass, in size and power, every thing of the kind yet afloat. She is to be of 650 horse power; to have engine room for 600 tons of fuel; complete stowage under hatches for 1,000 troops, with four months' stores and provisions, exclusive of a crew of about 450 men; and is to be armed with 20 guns of the heaviest caliber, besides carronades. The Cyclops, Gorgon, Geyser, and other war steamers now talked of as wonders for magnitude, will sink into insignificance as compared with this; the largest of them will be little more than half her size. For the sake of greater expedition she is to be made out of one of the large class frigates lately built (the Penelope, cut in two, with 55 feet in length added). The originator of this plan is John Edye, Esq., the able assistant surveyor of the navy (well known to all naval architects for his invaluable work on the "Equipment, Displacement, etc., of Ships and Vessels of War"), and she is to be completed at Chatham Dockyard, under his immediate superintendence and direction. The engines are to be on the Gorgon plan, and the commission for building them has been given to the inventors of that plan, Messrs. John and Samuel Seward. The vessel is expected to be fully completed and ready for sea before the close of the present year.

"The conduct of the government in this matter—conduct alike admirable for its vigor and promptitude—is, under the existing circumstances of the country, of a nature to give very general satisfaction. By nothing can such disasters as have lately befallen our arms in the East be so effectually repaired, or their recurrence more certainly prevented than by the fitting out of a few such leviathans of war as that which we have now described as being in progress. With half a dozen ships of this force at command, 6,000 men might within three weeks from the first receipt of the news from Afghanistan have been landed at Alexandria, marched in six days through Egypt (with leave of its Viceroy) to Cosseir, on the Red Sea, and transported thence in nine days more to Kurruckee, on the south coast of Scinde. With such a force there is hardly a corner of the world which British thunder could not reach in early time enough to uphold, against all opposition, British influence when linked in honorable alliance with the interests of human civilization and happiness (may we never know any other !). It is, moreover, a simple mechanical fact, which admits of no denial, that Great Britain can show forth a power in this way (thanks to her mechanics ! thanks to her workshops ! thanks to her practical science !) which no other country in the world can at all approach, far less rival. Every year, for the last half dozen, has witnessed some paper decree for the formation of a French steam navy, with engines of 300, 400, and 500 horse power, but where are they ? It is notorious that all France has never yet been able to produce an engine, good for anything, of more than 200 horse power. Were such an order, as has been just given by our Admiralty for a pair of 325 horse power each, to be furnished in nine months, to be given by the French Government to French manufacturers it could not be executed (if at all) in as many years."

ITALIAN PRIZES FOR AMERICAN VINES.—The London *Times* reports that the Italian Government has offered three prizes, amounting to $1,800, for vines raised from grafts of American varieties of grapevines capable of resisting phylloxera.

MILLER OIL CAN PATENT.—The House Committee on Patents agreed, Feb. 24, to report favorably to the House the bill extending the patent of Henry Miller on oil cans.

CHEAP SPECTROSCOPE.

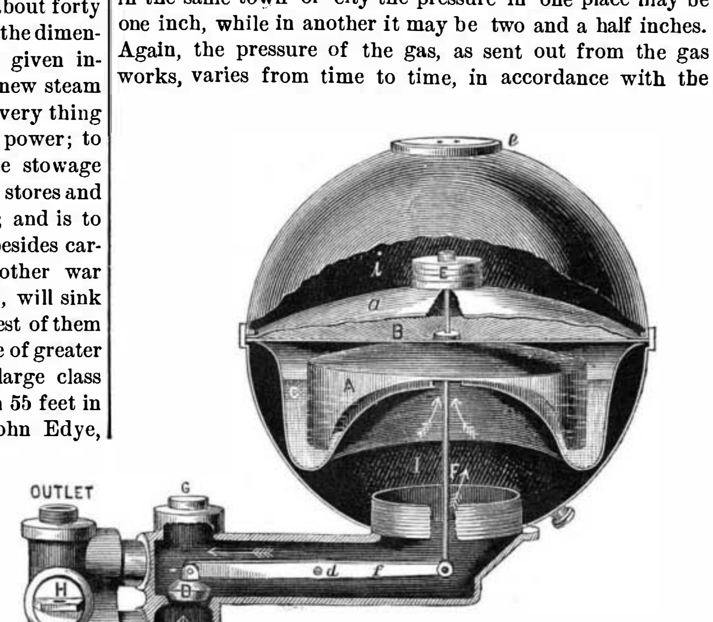
The Fraunhofer lines in the solar spectrum, and some of the bright-line spectra, can be seen by the aid of the following simple arrangemen

Make the slit in a piece of thin (very thin) sheet copper,

by laying it on a smooth surface—a planed deal board, say —and cutting the slit with the aid of an old sharp knife and a hammer. Get a piece of tubing with a shorter piece sliding in it to carry the slit, S, in the figure. The collimating lens, C, may be about 8 inches focus, and is placed its focal length away from the slit. A prism, such as may be bought for 50 or 75 cents at the optician's, held at P, will show a spectrum to the eye at E.

NEW GAS SAVER.

One of the difficulties connected with gas illumination is that the pressure in the mains varies considerably in different parts of a town or city, and at different hours of the day and night, consequently a system of lighting, adapted for a part of a town situated in a low level, will show inferior results in a more elevated situation. A rise of ten feet gives, roughly, a tenth of an inch of increase of pressure, as indicated by the manometer, so that it may easily happen that in the same town or city the pressure in one place may be one inch, while in another it may be two and a half inches. Again, the pressure of the gas, as sent out from the gas works, varies from time to time, in accordance with the



NEW GAS SAVER.

quantity consumed, and as public works, shops, etc., are suddenly lit up or extinguished at certain hours, private consumers are annoyed, in the one case by falling off in the amount of light, and in the other by a flaring flame and hissing sound; and, besides this, for every increase of pressure there is an increase of consumption without an equivalent increase of light.

The annexed engraving represents an instrument designed to obviate these difficulties. In this device a diaphragm is used, but it is not subject to deterioration, as in other forms of regulator, as it is protected from contact with the gas by a strong metallic shield; between the diaphragm and the gas there is at all times pure atmospheric air. This is an improved and most important feature, which, the inventor informs us, is entirely new in this class of inventions. The valve is perfectly balanced, and operates so that no matter how great or variable the pressure may be, it cannot operate on the surface of the valve. This arrangement obviates the necessity of putting on and taking off weights. The main mechanism is contained in a spherical copper case, connected to a hollow arm or casting at the bottom. At the end of the casting there is an inlet and an outlet, arranged for connecting a by-pass cock, H. The edges of a float, A, dip into the well or trap, C. This well or trap is primed with glycerine, a fluid that is neither volatile nor affected by heat or any degree of cold, and will never require changing. It prevents the gas from coming in contact with the diaphragm, and insures a perpetual seal around the cup, A. Across the center of the case there is a diaphragm, B, which prevents the glycerine from being displaced by the pressure of the gas, also prevents spilling of glycerine by accident. This peculiar formation of the glycerine holder or trap renders the moderator transportable to any distance and in any position.

When the by-pass cock is closed the gas will pass over the valve, D, and fill chamber, I, and the space under cup, A, as shown by the arrows. The cup, A, diaphragm B, and rod, F, are equally balanced by the valve, D, on the fulcrum, *d*, and lever, *f*. The pressure of the gas will raise the cup, A, and in doing so the rod, F, will be lifted, when the lever, *f*, will throw the valve, D, down on its seat.

To adjust the valve to the proper rate of pressure for gas, small weights are placed at E. When one burner is opened the cup, A, drops and opens the valve and lets out of the gas meter just enough gas for that one, and at a rate of pressure from which all the light is derived from gas, and so on for every burner that is opened. If one burner is closed the cup, A, rises, causing the valve, D, to close also, and so on for every burner that is closed.

If the pressure from the gas works increases while using one or more burners, the valve, D, drops and retards the flow of gas. If the pressure goes down at the works, the valve, D, opens and lets out more gas. This device is, in fact, a self-acting valve on the meter or mains, and the inventor claims that no amount of personal watching can equal this simple device.

By opening the by-pass cock the gas will go direct to the burners without being operated upon by the moderator.

The inventor of this instrument is Mr. J. S. de Palos, of Room 34, No. 206 Broadway, New York.

The Leyden Jar.

Mr. E. H. Gordon delivered lately a lecture at the London Institution on "The Leyden Jar." The lecturer proposed to tell his hearers something about this important portion of electrical apparatus, that they might see whether the study of its phenomena might not shed some welcome light on the way in which electrical forces acted in the great field of nature. The invention was arrived at accidentally, in 1746, by a Leyden University student, named Cuneus, who was trying to electrify water, and in the course of the experiment, having first unconsciously made himself part and parcel of a reservoir full of stored-up electricity, afterwards converted his body no less innocently into a discharging rod. The shock he got was so smart as to force from him the exclamation that not for the whole kingdom of France would he expose himself to such another. Subsequent investigation led to some clearing up of the phenomena and to the devising of safe arrangements for slowly filling a glass vessel with the electric fluid and emptying it in an instant at will. The common Leyden jar was described and its action shown and elucidated. Experiments followed with a greatly improved apparatus, which was no sooner filled with electricity than the fluid instantly overflowed like water, but in intensely vivid and loudly crackling sparks. Yet, as was experimentally demonstrated, there was no continuous stream, but only an aggregate of so many jarfuls. Moreover, the electric fluid, unlike water, could be made to fill the jar by pouring it outside. It was thus clear that the electricity acted in some way through the glass, which used to be regarded as an absolute non-conductor interposed between the two conducting surfaces, the outside and inside coatings of tin foil. The question in this, as in other instances, was one of more or less resistance to the electric strain, which many experiments proved to be very analogous to mechanical force. It was shown that in proportion as glass was heated the resistance was lessened, and other experiments illustrated the perforation of even very thick plate glass by concentrating upon one point the strain of the electric spark. Of course, the thinner the glass the more easily was it pierced. In like manner, the more rarefied the stratum of atmospheric air, the more readily did it transmit electric discharges. The experiment of the aurora tube was one of those performed in illustration of these statements.

An important phenomenon in connection with the Leyden jar was the so-called "residual charge," which a faint spark showed to have collected a few minutes after the discharging rod had done its part in emptying the reservoir. This was compared with the residual recoil of an elastic body which had been bent, but which needed a second effort in resuming its original position. What was more, Professor Ayrton's experiments on this problem, which were not only unpublished as yet, but had not even been laid before the Royal Society, proved that the phenomena in the two cases were the same in degree as well as in kind. The researches of Dr. J. Hopkinson, F.R.S., authorized the conclusion that the electric strain which spanned the cosmical spaces, as in the instance of the magnetic storms caused by sunspots and disturbing our electrometers, was as mechanical in its action as that transmitted through short distances, and which was quite under our own control. Lastly, the late Professor Clerk-Maxwell had mathematically demonstrated that the ether which fills all space was the identical medium which transmits electrical forces from the sun to the earth.

Submarine Communication with Australia.

About two years ago the Australian colonies expressed a desire for the duplication of the telegraph cable then existing between India and Australia. The Eastern Extension Telegraph Company (to whom the cable belonged) therefore sent out its managing director, Colonel Glover, R.E., who negotiated with the various colonies on the spot, and agreed, on behalf of the company, to lay a second cable in consideration of the payment by the colonies of a subsidy of £32,400 per annum for a period of 20 years. This agreement was ratified and signed in London on the 6th of May last, and it was then stipulated that the work should be completed within a period of eight months.

Subsequently, after a great portion of the cable had been manufactured, the Imperial Government became desirous of establishing telegraphic communication with its South African colonies, and entered into negotiations with Mr. Pender, who, with his usual energy, undertook to carry out their wishes. As it was of great importance that the utmost expedition should be used, application was made to the Australian colonies to allow this portion of their cable to be diverted for this purpose. This was agreed to, and the consequence was that the whole of the telegraph cable between Aden and Natal, a distance of 3,838 miles, was completed in December