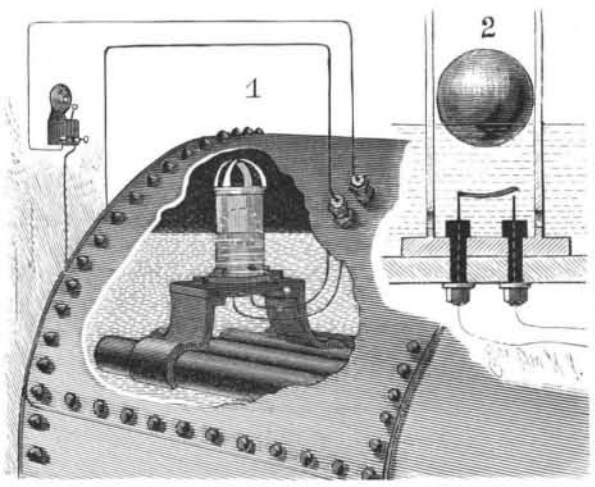
### A LOW WATER ALARM FOR BOILERS.

The illustration shows a simple, inexpensive, and extremely efficient device for giving an alarm when the water in a boiler in connection with which it is employed reaches the lowest level to which it may be allowed to fall. A casing is supported by brackets or other means in the water in the boiler, but preferably upon brackets attached to the tubes or flues, as shown in Fig. 1, and within the casing is a ball float, which rises and falls with the water. When the water reaches its lowest predetermined level, the ball rests upon a spring having a contact point at its free end, as shown in Fig. 2, and secured on an insulated plate attached to the bottom of the casing. The spring is connected with a wire forming part of an electric circuit, the other wire belonging to the circuit connecting with the contact plate engaged by the point of the spring, when the latter is pressed on by the weight of the ball. The wires are connected with a battery or other suitable source of electric supply, and in the circuit is a bell, gong, or other kind of alarm, of any approved construction, the alarm being sounded by the establishing of the electric circuit, which is accomplished when, by




MATHEWS' ELECTRIC LOW WATER ALARM.

the lowering of the water, the ball rests upon and presses down the free end of the spring.

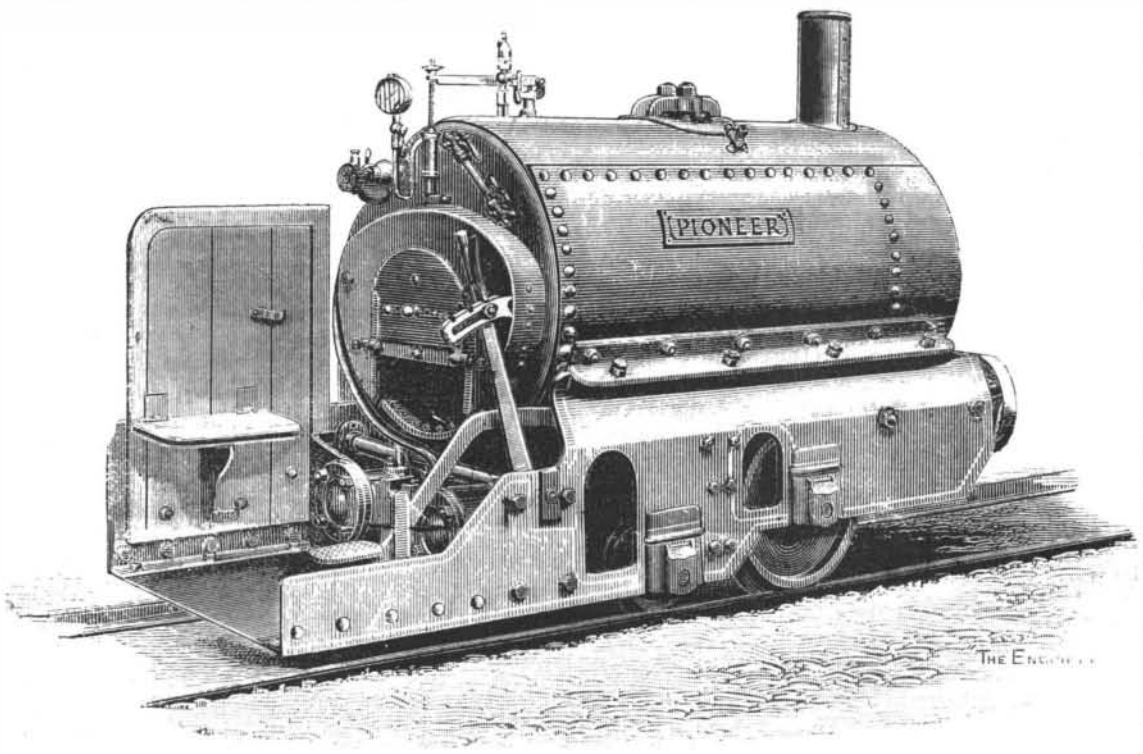
Further information relative to this improvement may be obtained of the patentee, M. Stephen M. Mathews, box 1153, Montreal, Canada.

### UNDERGROUND LOCOMOTIVE.

The engraving illustrates a small four-wheeled locomotive constructed by Messrs. Bickle & Co., engineers, Plymouth, for undergound haulage at the Levant Mines, Cornwall, to the designs of Mr. George Eustice, consulting engineer. The mines are situated on the rugged Cornish cliffs near the Land's End, and the underground levels extend for many miles under the Atlantic ocean; these levels are in places tortuous, and not exceeding five feet in height. Hitherto the metaliferous ores have been "trammed" by manual labor, from the various workings to the winding shaft. To lessen the cost of this work it was decided to employ a small locomotive, actuated by steam, and specially designed to meet these exceptional requirements. The boiler is constructed of steel with 33 in. by 2 in. gun metal tubes, for a working pressure of 100 lb. per square inch, with a large steam space to obviate as much as possible the necessity of stoking while passing through the smaller levels.

The cylinders are 4 in. diameter by 7 in. stroke, fitted underneath the boiler with the usual type of locomotive, valves and reversing gear. A powerful toggle joint foot brake is provided to control the load on the gradients, which run in places 1 in 24. At the rear of the engine a half cab is fitted with a low swing seat to give the driver command of the regulator, valve gear, foot brake, etc.

The engine has been satisfactorily tested under varying conditions on a temporary track laid at Messrs. Bickle & Co.'s yard for the purpose, and its advent in the Levant mines has been watched with considerable interest, and the engine will probably play an important part in the future development of some of the other deep and extensive Cornish mines. It is the first locomotive that has been used underground in Cornwall.—*The Engineer.*




LOCOMOTIVE FOR UNDERGROUND HAULAGE.

### Hook Swinging in Madras.

In spite (says the Madras correspondent of the London *Standard*) of the pressure of enlightened opinion and the appointment by the government of a commission of inquiry, the managers of the local festivals here do not appear disposed to abandon the practice of hook swinging. Arrangements have been made for the repetition of the rite. The person who has been induced to submit himself to the orders on this occasion is a youth of eighteen. So far, there is no sign that the authorities will interfere; the view taken in official quarters being, presumably, that as there is no immediate or necessary risk of life, and as the suffering involved is voluntarily endured by the victim, there is no ground for a criminal prosecution or prohibition. The codes, in short, protect animals from cruelty, but allow human torture, provided there is consent.

A description of this horrid practice appeared in the SCIENTIFIC AMERICAN of March 5, 1892, with illustrations showing the dreadful mode of human torture.

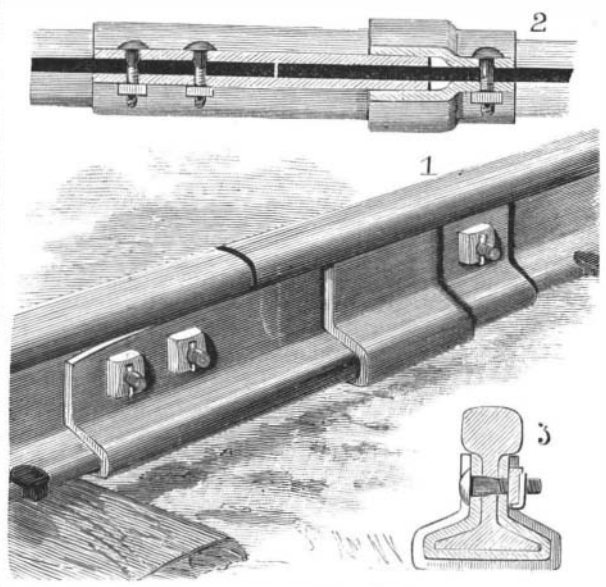
### Chromogen I.

Under this name the Farbwerke vorm. Meister, Lucius & Bruning are placing on the market a curious product which, so far as regards its mode of using, recalls the old and well known natural dyestuff cutch. Of itself, chromogen I has no color. It is sent out, says the *Dyer and Calico Printer*, in the form of a reddish cream-colored powder, which dissolves in water or alcohol to colorless solutions. When wool or silk is immersed in an aqueous solution to which Glauber's salt and sulphuric acid have been added, they take up some of the dyestuff, and if subsequently such charged fiber is placed in an acidulated bath of bichromate of potash, a fine reddish-brown is developed. This brown is quite fast to soaping, and is but slightly affected by acids and alkalies. Chromogen I may even be used with other dyestuffs to obtain a variety of useful shades of brown. In some cases, as with alizarin yellow, the second dyestuff may be added to the chromogen bath, while others, such as patent blue, cloth red, etc., are added to the bichromate bath. It is obvious, of course, that no dyestuff can be used which is in any way acted upon by bichromate of potash. It takes rather a large proportion (7½ per cent) of chromogen I to develop a full shade; with smaller quantities some fine pale tints of brown are obtainable.

Whether chromogen I will ever come into extensive use is doubtful, owing to the fact that the results of the operation of dyeing with it are not visible until after the material has gone through the second bath; and, as a rule, a dyer likes, if possible, to be able to see how his work is progressing, and, in particular, whether he is likely to get even shades. At the same time it may be said for chromogen I, as a rule, it goes on the fiber very easily and evenly.

### AN IMPROVED RAIL JOINT.

The meeting ends of rails may, by the joint shown in the illustration, be so held together that they cannot move laterally or vertically in relation to each other, while they may have the necessary longitudinal play to allow for expansion and contraction by heat and cold. The device may also be used to unite the ends of rails without regard to whether or not the joint comes above a supporting tie. The improvement has been patented by Mr. Richard Roxby, of Dartmouth,

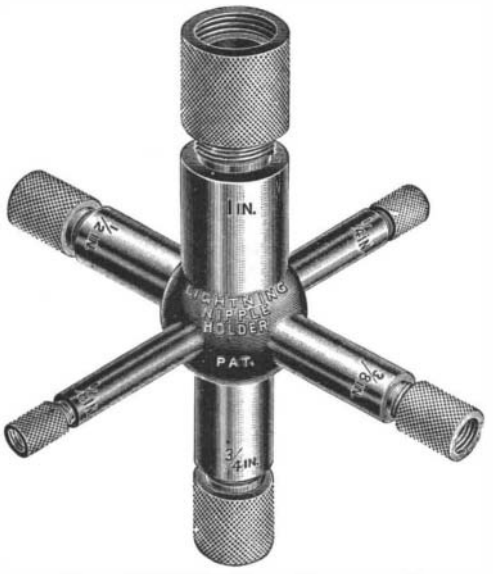



ROXBY'S RAIL JOINT.

Nova Scotia, Canada. As shown in perspective in Fig. 1, and in the sectional plan view, Fig. 2, a sheath is made to be easily slipped to place upon one of the rails, completely enveloping its lower portion, its vertical sides fitting snugly upon and being bolted to the web of the rail. The sheath is fastened to one rail only, but envelops the meeting ends of the two rails, another fastening sheath or jaw upon the opposite rail fitting snugly upon the outer end of the first sheaf. The securing bolts which pass through each sheath and the web of the rail have a squared portion next to the head, fitting a square hole in the sheath, to prevent their turning, and the nuts are fastened to the bolts by means of pins, as shown in Fig. 3, so that the nut cannot be accidentally removed. The main sheath is thinned and slightly rounded at the ends, and the sheaths are readily fastened to the rails and slipped one within the other, so that the joint is very easily made.

### A CONVENIENT TOOL FOR PIPE FITTERS.

The accompanying illustration represents a nipple holder for the use of pipers and steam fitters to hold nipples at one end so that they can be threaded without injuring the thread at the other end of the nipple. The advantages afforded by this convenient device




AN IMPROVED NIPPLE HOLDER.

will readily be seen and appreciated by those who have had their nipple holders lost or mislaid. Any one of the arms may be grasped in a vise to bring a required size into position. The nipple is made up in the coupling as far as it can readily be screwed with the fingers, and the coupling is then run down until the nipple stops against the plug. It is then ready to be cut out, and can afterward be taken out without trouble. The tool measures 9 inches across and weighs 4½ pounds. This handy implement has just been put on the market by the Wiley & Russell Manufacturing Company, of Greenfield, Mass.

AT the recent conversazione of the Royal Society, Dr. Gill projected on the screen a photographic star map containing the images of about 42,000 stars. As every star is a sun, we may infer therefrom something concerning the immensity of the scale on which the universe is established.