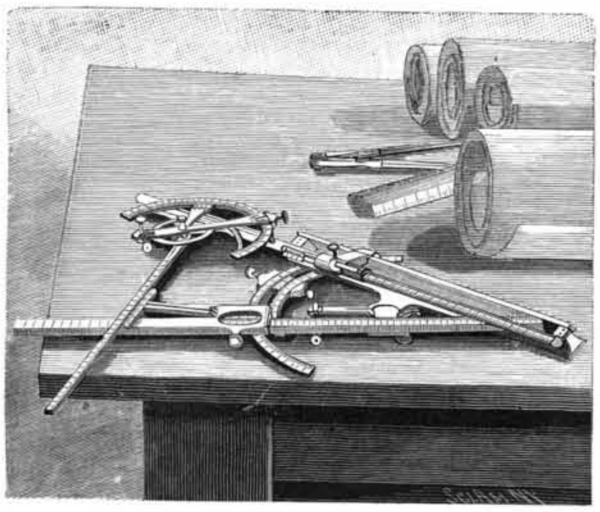
AN IMPROVED INSTRUMENT FOR ENGINEERS, SURVEYORS, ETC.

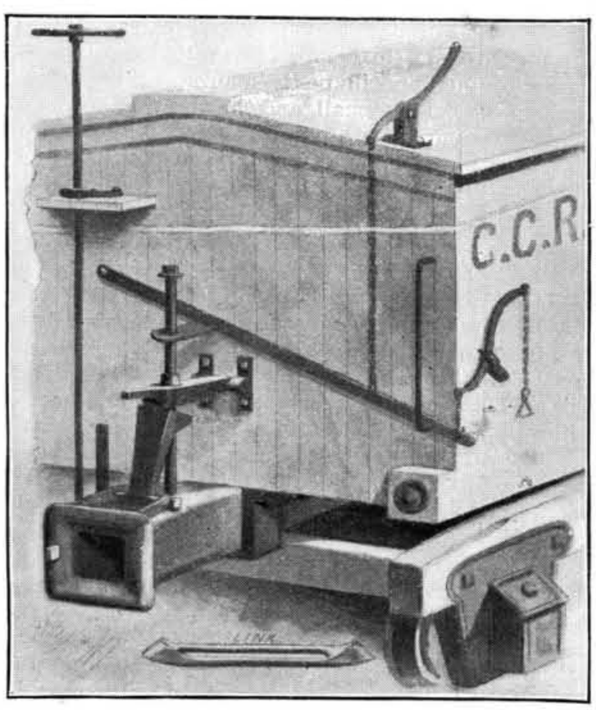
The illustration represents an instrument of comparatively simple and durable construction, well adapted for an extended field of work. It is designed to facilitate the direct calculation of triangles without the use of plotting or other instruments, and for reading latitudes and departures for any course—down to minutes if desired—for chains, poles and links, at a single observation. The improvement has been patented by Mr. William Hinton, of Hinton, West Va. (box 141). The base of the instrument supports a graduated distance scale on which is an adjustable slide with vernier, and on the inner edge of the base is an arm connected by a pivot with a similar arm attached to a straight meridian scale, having graduations. Graduated arcs, which may be clamped together in a sliding vernier, are pivoted to the meridian and distance scales, and on the forward end of a slide on the meridian scale is an extension on which is pivoted a T-square, with head graduated and fitted on a departure scale secured to a pivot in a bracket projecting from a slide on the distance scale. On this pivot are also two arms reading on a second protractor. The instrument is designed to be easily manipulated, and to greatly facilitate engineering and surveying work.



HINTON'S SURVEYOR'S INSTRUMENT.

AN IMPROVED CAR COUPLING.

This coupling is designed to automatically couple two meeting cars, and the uncoupling may be effected from the side or top of the car. The improvement has been patented by Messrs. James W. Tolar, of Wilksburg, and Benjamin D. Langston, of Goss, Miss. The rear end of the drawhead terminates in a downwardly inclined wall, adapted, by contact with similar inclined faces on each end of the link, to maintain the latter in horizontal position. The coupling pin is of considerable length, but has, at a proper distance from its lower end, a collar designed to rest on a collar in the top of the drawhead when the pin is lowered into coupling position. A removable head is also screwed on top of the pin. On the end wall of the car is pivoted a latch piece through which slides the upper portion of the coupling pin, and a locking dog, adapted to engage and support the latch piece, is pivoted on the upper side of the drawhead in advance of the pin. A downwardly projecting pintle shaft passing through the dog body is pivoted at its lower terminal on a slide bolt, there being also pivoted to the pintle shaft an oppositely sliding pusher rod, pressed outward by a coiled spring. Above the latch piece the coupling pin is loosely engaged by the perforated arm of a transverse pivoted lever having movement in a guide piece, this lever being raised to lift the coupling pin, when the cars are to be uncoupled, by means of a chain connection with a tripping lever on the top of the car, or by a hand lever at the side. For automatic coupling, the link is projected horizontally from one of the drawheads, being supported at its rear end by engagement with the inclined portion at the rear of the drawhead recess, and the pin being dropped. As the link enters the approaching drawhead, on which the coupling pin is held elevated by the dog, the projecting slide bolt is pressed rearwardly, which rocks the dog and releases the pin, which drops by gravity to effect the coupling.



TOLAR AND LANGSTON'S CAR COUPLING

The Hudson River.

The Hudson River, as we call it, along the western shore of the island of Manhattan, is now a majestic estuary rather than a river, and is deep enough for all the uses of great ships. But its present bottom is formed of the rock wreckage of an earlier day, which has largely filled up a chasm once several hundred feet deep, through which the old river ran.

So colossal was the sheet of ice which came sweeping down from the northwest over the top of the Palisades in the ice age that this ancient chasm of the Hudson River—a veritable canon once—changed its course no whit; for the direction of the grooves and scratches seen everywhere on the exposed surface of the Palisades, and pointing obliquely across the river's course, run in the same direction as do those on the rocks over which the city stands.

It not infrequently happens that steamers and ships bound for New York, when not quite certain of their whereabouts as they approach the coast, are compelled to seek what help they can by consulting the nearest land, which, under these conditions, is the sea bottom. The sea bottom along our coast has been so often and so carefully "felt" that we know a great plateau extends out beyond the coast line for some eighty or ninety miles, where it suddenly falls off into the great depths of the Atlantic. The place on which New York stands was, it is believed, once much higher than it is now, and was separated from the North Atlantic border by some eighty or ninety miles of low seacoast land, now submerged, and forming this great continental plateau. Indeed, the New Jersey and adjacent coast is still sinking at the rate of a few inches in a century.

For us to-day the Hudson River ends southward where it enters New York Harbor. But a channel, starting ten miles southeast of Sandy Hook, and in a general way continuing the line of the Hudson, runs across the submerged continental plateau, where finally, after widening and deepening to form a tremendous submarine chasm, it abruptly ends where the plateau falls off into the deep sea.

This chasm near the end of the submerged channel is, if we may believe the story of the plummet, twenty-five miles long, a mile and a quarter wide, and in places two thousand feet in vertical depth below its submerged edges, themselves far beneath the ocean's surface.

This "drowned river" is probably the old channel of what we call the Hudson River, along which a part of the melting glacier sent its flood during and at the close of the Age of Ice.

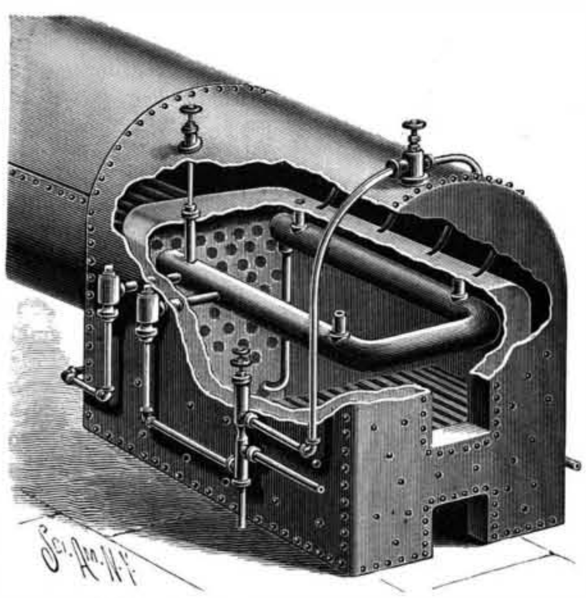
And so at last—rounded and smoothed rock surfaces, where once sharp crags towered aloft; glacial grooves and scratches on every hand; erratic bowlders, great and small, cumbering the ground; a typical rocking stone delicately poised by vanished forces long ago; a terminal moraine so great that it forms picturesque landscape features visible many miles away—these are some of the records of the great Ice Age which one may spell out in a holiday stroll about New York.—T. Mitchell Prudden, M.D., Harper's Magazine for September.

Practical Method of Soldering Aluminum.

After numerous experiments with various suggested solders and fluxes, I am impressed that the real trouble in soldering aluminum is due to a film, probably an oxide, that quickly forms upon the surface and prevents contact and union of the metals. If this film is removed or broken up while the solder in a molten state is in contact with the aluminum, there seems to be no difficulty in obtaining perfect union. The conditions, though differing in degree, seem to be precisely the same in kind as when using the tin alloy solders upon iron; there must be presented to the solder a perfectly clean metallic surface at the moment that the molten solder is applied, in order to secure union. With iron and many other metals this may be secured by chemical means, and preserved a sufficient length of time, by means of various fluxes, to obtain the desired result. With aluminum the same procedure fails, seemingly because all the fluxes heretofore suggested fail to maintain for a sufficient length of time the indispensably clean metallic surface. I find, however, that if the aluminum is heated sufficiently to keep in a molten state the tin or tin alloy used as a solder, and then, with a suitable tool, its surface immediately under the molten solder is scraped so as to remove or break up this resisting film, union immediately takes place, without the use of any flux whatever. By this means the surface of the aluminum can be, to use a technical expression, "tinned," and the surfaces, thus prepared, readily united by soldering. I find no difficulty in thus soldering aluminum to itself or to other previously tinned metals. In the choice of alloys for solder there seems to be a wide latitude. Pure tin may be used; indeed, any alloy fusing at a less heat than aluminum, of which tin is a component, seems to give satisfactory results. Those melting at a low heat may be manipulated by the soldering iron, while the blowpipe or its equivalent is required for those fusing at a higher temperature. An alloy of tin 50, silver 25 and aluminum 25, melts at about 750°. This makes a strong solder, and promises satisfactory results.—Naaman H. Keyser, D.D.S., in the Dental Cosmos.

AN EFFECTIVE FEED WATER HEATER.

With the improved means of boiler feeding herewith illustrated, not only will the incoming feed water be quickly and thoroughly heated, but there will be caused a rapid circulation of the water in the boiler when the feed is stopped. A patent has been granted for this improvement to Mr. William L. Harvey, of Stanberry, Mo. In the top of the fire box, suspended from the crown sheet by hollow stays, is a U-shaped tube, one end of which has a downwardly extending pipe opening into the leg of the boiler, while the other end of the tube is connected with feed water supply pipes extending to opposite sides of the boiler. These pipes are connected with injectors, each provided with a steam supply pipe leading from the top of the boiler, each injector also being connected with the source of the water supply and with an overflow pipe, either injector to be used singly or both together, as desired. On the inlet end of the U-shaped tube is a pipe extending up into the water compartment, the upper end of this pipe being normally closed by a valve, whose stem passes through the shell of the boiler and is provided with a handle. It will be seen that the water passing through the tube in the top of the fire box may become highly heated before it enters the boiler, but when the feed is stopped and the valve controlling the pipe connecting the water space of the boiler with the inlet end of the tube is opened, an active circulation will be kept up in the water in the boiler.



HARVEY'S FEED WATER HEATER.

A Moving Mountain.

A traveling mountain is found at the Cascades of the Columbia: It is a triple-peaked mass of dark brown basalt, 6 or 8 miles in length where it fronts the river, and rises to the height of almost 2,000 feet above the water. That it is in motion is the last thought that would be likely to suggest itself to the mind of any one passing it, yet it is a well-established fact that this entire mountain is moving slowly but steadily down to the river, as if it had a deliberate purpose some time in the future to dam the Columbia and form a great lake from the Cascades to the Dalles.

In its forward and downward movement the forest along the base of the ridge has become submerged in the river. Large tree stumps can be seen standing dead in the water on this shore. The railway engineers and brakemen find that the line of railway that skirts the foot of the mountain is being continually forced out of place. At certain points the permanent way and rails have been pushed 8 or 10 feet out of line in a few years.

Geologists attribute this strange phenomenon to the fact that the basalt, which constitutes the bulk of the mountain, rests on a substratum of conglomerate or of soft sandstone, which the deep, swift current of the mighty river is constantly wearing away, or that this softer subrock is of itself yielding at great depths to the enormous weight of the harder mineral above.—Goldthwait's Geographical Magazine.

Electricity on Common Roads.

The hopes cherished by some electricians as to the possibilities of electrical traction on ordinary railroads are not likely to be fulfilled by the adoption of any known system of electrical working. The most that can reasonably be claimed for existing appliances is the possibility of running a through train from point to point, but the general application of electric traction—involving the fitting up of station yards and branch lines—cannot be entertained by any sober thinking man, and even the partial application to through express passenger traffic is very improbable, for there is not much hope in any system involving a double motive power, electricity for a few special trains and steam for the remainder. There would be no money in such a double outlay.

There is, however, a field for the employment of electricity that appears to present certain possibilities of success and usefulness. We refer to its use on the common roads. Any objections that may be felt to the use of the overhead system in towns lose much of their force when country roads are considered, and there are numerous good roads in the country where, by means of the overhead system, a very considerable traffic could be conducted between towns and villages or outlying places and the nearest railway. The very onerous charges made by the railways of this country for the carriage of farm produce has had the effect of very seriously curtailing the agricultural production of the country in favor of the foreigner, whose product is almost invariably carried by our own railroads for very much less than home produce.

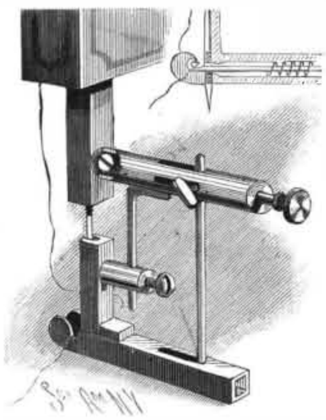
So onerous have the railway charges become—notably on the South-Eastern—that many market gardeners have, we are informed, ceased to use the line and have reverted to the roads, finding that, as compared with the railway charges, they can save both in time and money by doing so. That there must be a screw loose somewhere is evident. Horse traction has no right to be cheaper than steam traction on a railway, and, of course, would not be if the railway directors used their brains. What we should like to see tried is an overhead electrical conductor along some main road to London that is traveled by the market gardeners' vans, such, for example, as the roads from Orpington. The farmers would bring their vans to the line at the home end, and on arrival at the city boundary other horses would take off the vans to their destination, the miles between being covered by electric haulage. A suitable motor would be somewhat upon the lines of the present steam traction engine with the engine removed and an electric motor substituted. The current for such a line could very well be furnished by some existing electric light station, for the haulage is performed, we believe, in the early hours of the morning after the lights are out. The empty vehicles would be hauled back to the country as a day load, reaching home before dark, and thus being entirely a source of profit to a lighting station. Should such a scheme appear to contain the elements of success in its crude form, there is little doubt but that very shortly special motor vans would be built to replace the separate motor. A motor geared down to the axles of the van itself would involve none of the extra weight inseparable from the independent motor, while at the same time a loaded van would have ample tractive weight to draw after it other vehicles. Our English roads are so good that the traction upon them is by no means heavy, and we do not see any very inseparable difficulties in the way of realizing such an idea. Farmers must have horses, and so there would be no difficulty in bringing the loads up to the line any more than there now is in bringing loads to the railway. In many cases, too, there would be nothing to prevent a farmer having a conductor right into his farm when near the main line, and so entirely dispensing with horse traction at the home end. Obviously, the first application of the idea would be upon roads leading out of the large cities some few miles only, but the rapid extension of electric lighting to towns along the roads offers such possibilities of relays that it would frequently happen that a pole line could be carried many miles without such a gap occurring as would demand a special generating station. The outlay on such a scheme would therefore be limited to the poles and conductors, and its financial possibilities would be favorable by reason of the fact that the only power required would come in as a day load and therefore serve to reduce the cost of the electric light stations fortunate enough to be called on to supply the current. —Electrical Review, London.

New Wood Stains.

A solution of fifty parts of commercial alizarin in one thousand parts of water, to which solution of ammonia has been added drop by drop until a perceptible ammonia odor is developed, will give to fir and oak a yellow-brown color and to maple a red-brown. If the wood is then treated with a one per cent aqueous barium chloride solution, the first named become brown and the latter a dark brown. If calcium chloride be used instead of barium chloride, the fir becomes brown, the oak red-brown and the maple a dark brown. If a two per cent aqueous solution of magnesium sulphate be used, the fir and oak become dark brown and the maple a dark violet-brown. Alum and aluminum sulphate produce on fir a high red and on oak and maple a blood red. Chrome alum colors maple and fir reddish-brown and oak Havana brown. Finally, manganese sulphate renders fir and maple a beautiful dark violet-brown and oak a dark walnut-brown. All the colors are said to be very fine.

AN IMPROVED NEEDLE THREADER.

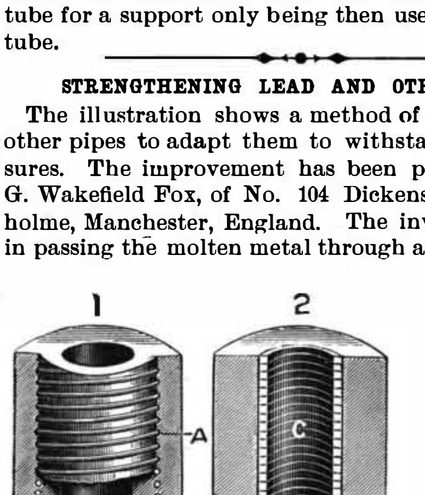
The illustration represents a device more especially adapted for threading needles of sewing machines, being easily applied to the needle bar and needle, and adjustable vertically and laterally to afford a perfect fit. It has a threading hook adapted to positively find and penetrate the needle eye and engage and automatically pull back the thread. The improvement has been patented by Mr. C. S. Goldman, Nos. 21 and 23 Center Street, New York City. Its lower portion has an upwardly extending grooved offset, adapted to receive any needle carried by the needle bar, lips notched to receive the thread extending horizontally on opposite sides to protect the threading hook, the latter having a shank sliding longitudinally in a bore which is reduced and tapered to guide the hook accurately through the needle eye. Extending up from the shank of the hook is a rod whose upper end is adjustably held by a slide block or plunger moving in a hanger tube having an open end adapted to be readily applied to a set screw on the needle bar, although the threader may be used without attaching it to the set screw. The plunger has a shank extending through the back end of the tube, terminating in a finger piece, and is normally pushed back by a spring. Extending down from the hanger tube is a rod adjustably secured by a set screw in a lug at the back of the vertical offset in which the needle is received, thus enabling the lower portion of the threader to be adjusted vertically to bring the hook opposite the needle eye. In operation the thread is laid in the notches and the operator presses on the finger piece, forcing the hook and thread through the needle, the spring carrying the hook with the thread back, so that when the threader is removed the needle is left threaded. A modification of this improvement consists in forming the shank of the hook as the spring pressed plunger, as shown in the small view, a short tube for a support only being then used as the hanger tube.



GOLDMAN'S NEEDLE THREADER.

STRENGTHENING LEAD AND OTHER PIPES.

The illustration shows a method of making lead or other pipes to adapt them to withstand heavy pressures. The improvement has been patented by Mr. G. Wakefield Fox, of No. 104 Dickenson Road, Rusholme, Manchester, England. The invention consists in passing the molten metal through a die and around the end of a core or mandrel and simultaneously feeding a wire into the metal at the die. As shown in Fig. 1 the coil of wire, A, is completely embedded in the wall of the pipe, B indicating the cross sectional area of the pipe occupied by the wire. In Fig. 2 the coil, C, is shown embedded in the inner surface of the pipe. In each case the convolutions of the wire coil are firmly united with the metal.



FOX'S METHOD OF MAKING PIPES.

The English Language.

The principal languages which compete with English, not considering such as Chinese and Hindostanee, are French, Spanish, Russian, and German. French is practically stationary as regards the number of its adherents; Spanish is largely spoken in South America and the southern part of North America, but it owes its prominence to the colonizing genius of its speakers; where German is introduced it rapidly gives way to the native tongue, generally English; Russian, like the German, has little influence upon the Western civilization. It is a remarkable fact that, while the English in their colonies and offshoots have absorbed millions of aliens, there is no record of any great body of English speakers having become absorbed by any other race.

In the United States there are millions of Germans and other foreigners who have become merged with the English speakers in a single generation, they losing even their family names; and the children in many cases do not understand their parents' language. In Canada, however, the French-speaking population is increasing faster than the English-speaking. This is not because the French element absorbs the English, but because it crowds it out. While the French is seldom absorbed by any other tongue, it is almost always absorbed by the English. The English has practically driven the French out of Egypt, and it is rapidly driving the Dutch out of Africa. This has been accomplished in Egypt within a dozen years. The change in Africa is being effected with even greater rapidity. As the English-speaking settlers rush into the new country, the Dutch and other languages, which are rarely to be met with, drop into the backwoods and are finally lost. Africa is witnessing a repetition of the fight of the tongues in America three centuries ago, which resulted in a victory for the English. The history of lingual development in America alone is a sufficient argument for the prediction that no languages, excepting possibly those of the Orient, will long remain formidable competitors of the English.—Troy (N. Y.) Press.

Telegraphic Communication by Induction by Means of Coils.

In a paper recently read before the Royal Society of Edinburgh, by Mr. C. A. Stevenson, the results are detailed of some experiments with the view of establishing communication between North Unst lighthouse, situated on Muckle Flugga, and the mainland, and thence to the lighthouse station at Burrafiord, a distance of two miles. A number of experiments were made in the laboratory to discover the laws of the action of coils on each other, with a view of calculating the number of wires, the diameter of coils, the number of amperes, and the resistance of the coils that would be necessary to communicate with Muckle Flugga, and after a careful investigation, it was evident that the gap of 800 yards could, with certainty, be bridged by a current of one ampere with coils of nine turns of No. 8 iron wire in each coil, the coils being 200 yards in diameter. It was found that 100 dry cells, with 1·2 ohms resistance each and 1·4 volts, gave good results, the observations being read with great ease in the secondary by means of two telephones. The cells were reduced in number down to 15, and messages could still easily be sent, the resistance of the primary being 24 ohms and the secondary 260 ohms. The hearing distance is said by Mr. Stevenson to be proportional to the $\sqrt{}$ of the diameter of one of the coils, or directly as the diameter of the two coils, so that with any given number of amperes and number of turns to hear double the distance requires double the diameter of coils, or double the number of turns, and so on. But this is within certain limits, for when the coils are close to one another the law does not hold. With regard to the question whether or not the parallel wire system is actuated by induction or conduction, it will, Mr. Stevenson says, depend how the ends are earthed, or in short, what is the distance bridged in comparison to the breadth of base, which predominates. Where the wires are long in comparison with the distance bridged, conduction will be the main working factor, but when the base is small, and the distance bridged is large in comparison, induction will be the main factor, and the number of turns then increases the effect.

Improvements in Mantles or Hoods for Incandescent Gas Burners.

L. K. BOHM, NEW YORK, AND T. C. CRAWFORD, NEW BRIGHTON.

The new composition material consists of about 90 per cent of magnesium oxide, about 10 per cent of silicic acid, and about 1 to 2 per cent of an alkali. The silicic acid may be partly replaced by calcium or magnesium phosphate. The most suitable alkali is potassium hydrate or carbonate. The silicic acid may be used as dry powdered SiO_2, but the authors get the best results by employing gelatinous silica. The gelatinous silicic acid is obtained by precipitating a solution of water glass with hydrochloric acid, filtering, and washing. One part by weight of the moist precipitate is well mixed with four parts by weight of a saturated aqueous solution of sugar, and one part of magnesium oxide, and a small quantity of alkali gradually added with constant rubbing. In this way a plastic mass is obtained which may be moulded into the form required for the mantle or hood, or spun into threads and the mantle woven. The hoods are then burned in a baking oven. In this way a mantle or hood is produced such that, while consisting mainly of free magnesium oxide, it is an efficient glow body, contains a skeleton of a double potassium and magnesium silicate giving great stability and hardness.