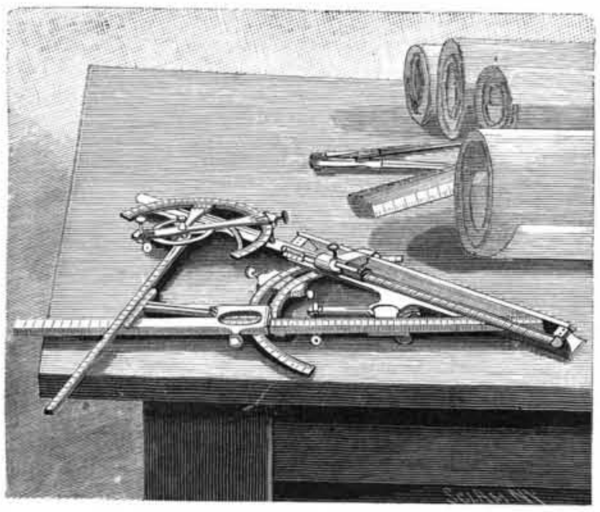
AN IMPROVED INSTRUMENT FOR ENGINEERS, SURVEYORS, ETC.

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.

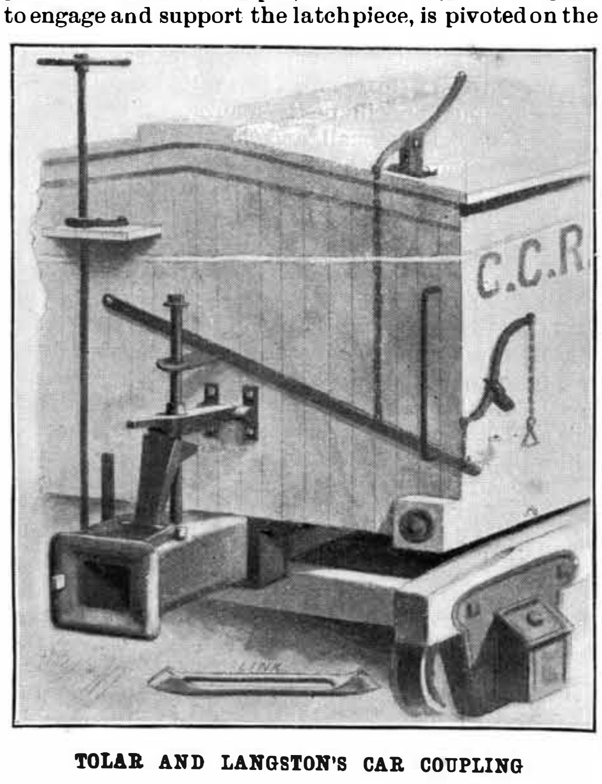


HINTON'S SURVEYOR'S INSTRUMENT.

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.

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



TOLAR AND LANGSTON'S CAR COUPLING

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.

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.

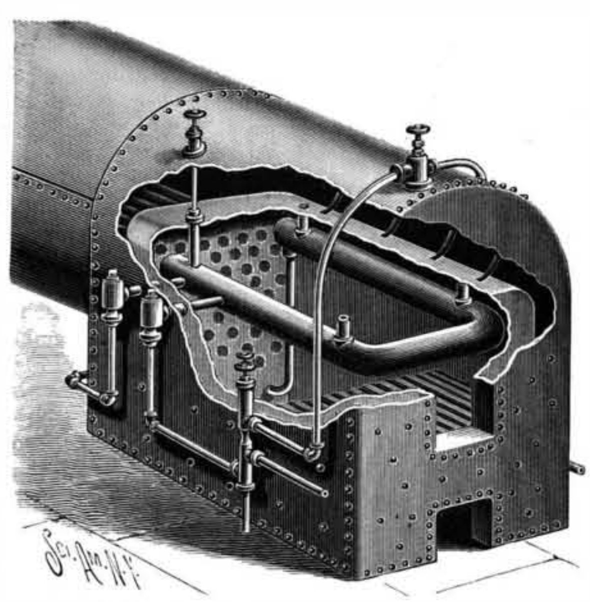
And so at last—rounded and smoothed rock surfaces, where once sharp crags towered aloft; glacial grooves and scratches on every hand; erratic bowlders, great and small, cumbering the ground; a typical rocking stone delicately poised by vanished forces long ago; a terminal moraine so great that it forms 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 blow-pipe 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



HARVEY'S FEED WATER HEATER.

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.

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.