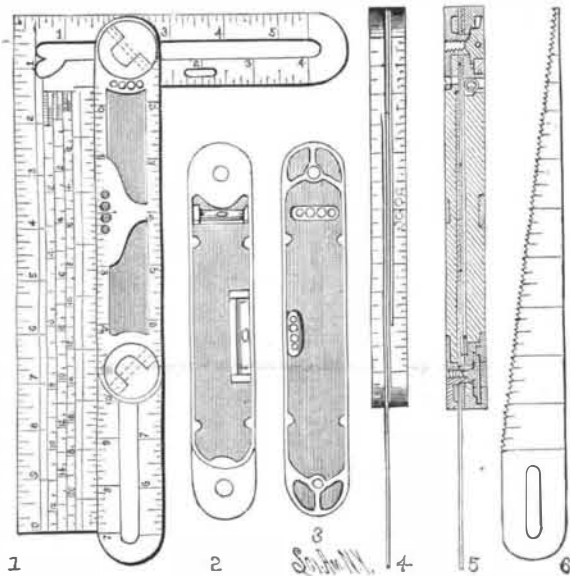


## AN INGENIOUS COMBINATION TOOL.

The illustration represents an improvement combining a variety of tools, as T squares, try squares in various forms, framing squares, bevels, plumbs, levels, etc., adapted to be used for various purposes. It has been patented in the United States and foreign countries by Mr. Townsend Harris, of Brainerd, Minn. Fig. 1 is a plan view of the tool, Fig. 2 showing one-half of the stock and Fig. 3 the other half, while Figs. 4 and 5 are side elevations, and Fig. 6 shows a keyhole saw adapted to be secured to the stock. At one end of the stock is arranged a bevel blade and on the other end is the square, the stock being made in two principal sections in the form of wooden-lined metallic casings, held one upon the other by apertured sockets engaging threaded lugs. On the lugs between the casings is also fitted a middle blade with a graduation, while on one lug is hung the square and the other lug forms a pivot for a slotted bevel blade. There are two levels, one at right angles to the other, their glass tubes being protected by elastic cushions against shocks of the stock. The faces of the stock, as well as those of the square and slotted bevel blade, have graduations representing inches and subdivisions, and one face of the shorter member of the square has a protractor graduated in degrees and subdivisions. It is also possible to use with the stock a number of squares having their members of different lengths, and different lengths of bevel blades, only one square and one bevel blade being used at a time in connection with the stock. The parts may be adjusted to set the bevel blade to the protractor to form an indicator to give the two angles of forty-five degrees and one hundred and thirty-five degrees, and the graduation on the protractor is so arranged as to give any angle, and also the angle of a polygon at the same time, or adjustments may be made whereby the



HARRIS' COMBINATION TOOL.

device may be readily used for drawing purposes and for transferring angles from the drawings to the work.

## What is Injurious to the Eyes.

A writer in the *Reading Times* reports a statement made by an eminent oculist to the effect that typewriting has an injurious effect upon the eyes.

The operator is obliged to glance incessantly back and forth from the keyboard to the shorthand notes, and this is a muscular exercise of the most fatiguing sort. For this reason the oculist urges it is desirable for the typewritist to cultivate a familiarity with the keyboard similar to that possessed by the accomplished pianist with the keyboard for his instrument, so that it will be necessary to look at the keys as little as possible.

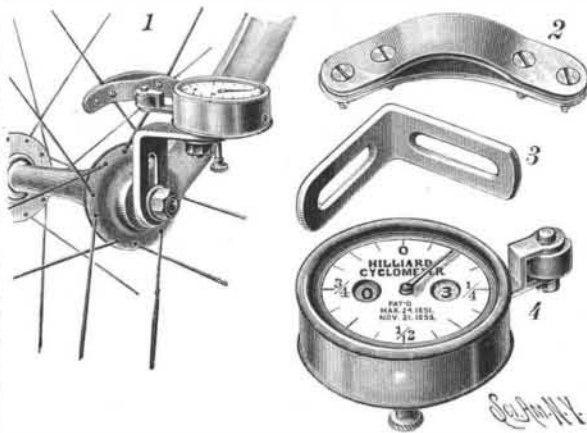
While the injury that may result to the eyes of a hard-working typewritist who is not sure of her fingers and her keys is not to be regarded too lightly, it is not likely to be nearly as serious as that resulting from the practice indulged in by so many in these days of railroad travel of persistent reading on trains. This practice is most trying on those delicate muscles that regulate the shape of the eyes' lenses and so affect the focalization of the organ. The danger is greatest, of course, on those railroads whose ballasting is imperfect and whose rails are roughly laid, producing much jarring and consequent rapid changing of the distance between the eye and the paper.

In some cases the eyes of a victim of the railroad reading habit are so affected as to focus at different distances, and then his sufferings are most acute, and though much relief may be afforded by the treatment of a skilled practitioner, nothing but a discontinuance of the habit will afford a perfect cure.

In the case of a person who suffered tortures for two or three years from eye disorder, due to train reading, neither rest nor professional skill availed until by accident the yellow window shades in the office in which he was employed were removed, when he was able at once to work with greatly increased ease and comfort, and in a few months was entirely cured.

## THE HILLIARD CYCLOMETER.

This finely finished and very neat little device, of which the case and attachments are nickel plated, can be attached in five minutes' time to any bicycle, and will afford an accurate register of the distance the rider



THE HILLIARD CYCLOMETER.

passes over. It is manufactured by the Hilliard Cyclometer Company, 1128 and 1130 N. 40th Street, Philadelphia, who make it in two styles, the No. 1, adapted to register twelfths of a mile up to 1,000 miles, and the No. 2, which registers sixteenths of a mile up to 100 miles. Fig. 1 shows the manner of its attachment to the fork on left hand side of front wheel, Fig. 3 representing the slotted angle piece by which its adjustment in position is easily effected, and Fig. 2 showing the interfering band, to be fastened to the wheel in such position that, at each revolution of the wheel, the band will move and roll over the lever projecting from the cyclometer casing. The device is placed where one can see it all the time, and it is an exceedingly simple matter to adjust it in position. Its action is positive, and every wheel in it is locked to prevent rattle. The instrument has met with great favor among bicycle riders during the past two seasons.

## THE SEVENTH AVENUE BRIDGE OVER THE HARLEM RIVER, NEW YORK CITY.

Some time ago we illustrated the 155th Street viaduct in this city; it provides an elevated roadway leading from the high ground at 155th Street and 9th Avenue to the abutment of the 7th Avenue bridge over the Harlem River, a structure long known as the McComb's Dam bridge. The improvements included an approach to the bridge, and the line of communication across the Harlem River is now on the point of being completed by a viaduct on the north side of the river and by a steel bridge crossing it. The two viaducts and bridge together are one of the greatest engineering operations hitherto carried out by this city. In the cut we present a view of the bridge proper, which spans the river, as it appeared in process of erection, with some of the false work still in position.

The structure is of steel supported by granite piers, which rest upon deep foundations, two having been established by compressed air caissons, and one by a deep coffer dam.

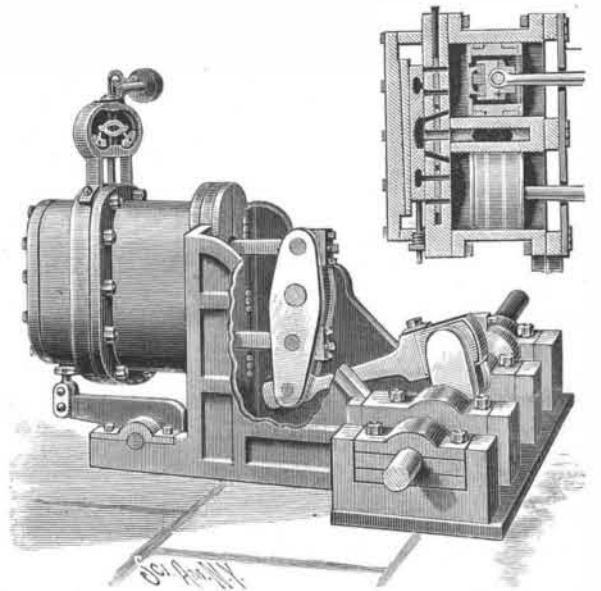
The principal object in the illustration is the steel draw span, which is carried on a central pier. Between the outer limits of the end piers of this truss is a width of 400 feet, the span from center to center of the end piers being 415 feet, and a clear height of 28 feet above tide water is given. The center pier width measures, from the outside of the fenders, 70 feet, so two very wide openings, each of 165 feet, are provided when the draw is open. The bridge provides a 40 foot roadway, with a 9 foot sidewalk on each side. It is carried on coned rollers, a double drum intervening between floor and rollers supporting the weight. The construction

was an interesting operation. As the floor was established, two lines of rails were laid on the outside edges, and a traveling scaffold carried by wheels traversed the length of the bridge, and from it the pieces were hoisted into position. The total weight of the draw span is 2,400 tons. It is floored with iron buckle plates covered with asphalt for the roadway. A steam engine established on the pier beneath the bridge turns it, 1½ minutes being required for the operation.

Our thanks are due to Mr. Alfred P. Barler, of this city, who is the engineer of the structure, for information given.

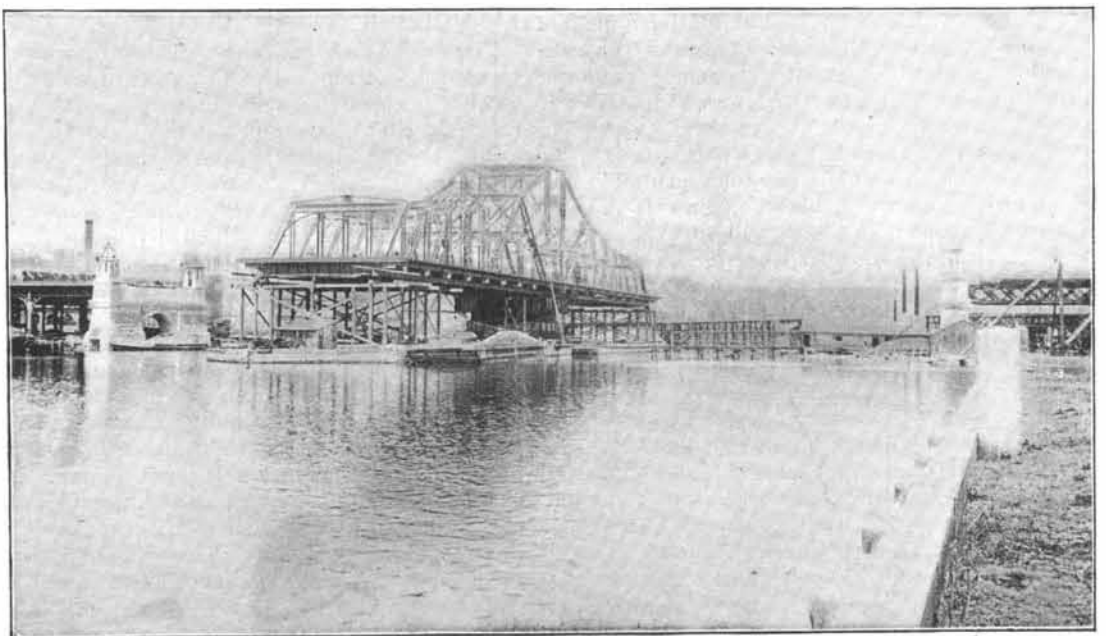
## A QUICK SPEED STEAM ENGINE.

This engine, patented by Mr. John P. Devoissaud, of Sherman, Texas, is designed for high pressures and for the development of a maximum of power with an economical use of steam. Forwardly located on the box-like bed plate are two steam cylinders, one upon the other, and of equal diameter, preferably integrally formed, and having an exhaust passage common to both in the wall that divides them, as shown in the small sectional view. In the oblong head plate bolted on the front ends of the cylinders is a vertical channel, which receives a flat, thin throttle valve, the exterior surface of the plate containing the valve seat for the main valve, sliding in a rectangular steam chest, the valve being maintained at all times in loose contact with the seat. The valve seat and head plate are oppositely slotted at two points near each end, providing two live steam ports that in pairs intersect the bore of each cylinder at points equally removed from its axis, and at points equally distant from the nearest live steam ports are exhaust ports inclined toward the common exhaust port. A flat stem projecting upward from the throttle valve is detach-



DEVOISSAUD'S QUICK SPEED STEAM ENGINE.

ably connected to a governor of novel construction, which forms the subject of a separate patent issued to the same inventor. The rear ends of the cylinders are closed by swinging doors to exclude dirt, and a flange affords means for a stable connection with the bed plate, which is upwardly extended as housing frames on each side, and shown partly broken away in the illustration. The main valve is so adjusted that it will alternately admit steam into one cylinder and connect the exhaust port of the other cylinder with the common exhaust passage, so that the pistons are successively acted upon by the steam, and, as the traverse of the piston heads is short, as compared to their area, a high speed is designed to be attained with low frictional resistance.



THE GREAT SWINGING BRIDGE OVER THE HARLEM RIVER, NEW YORK CITY.