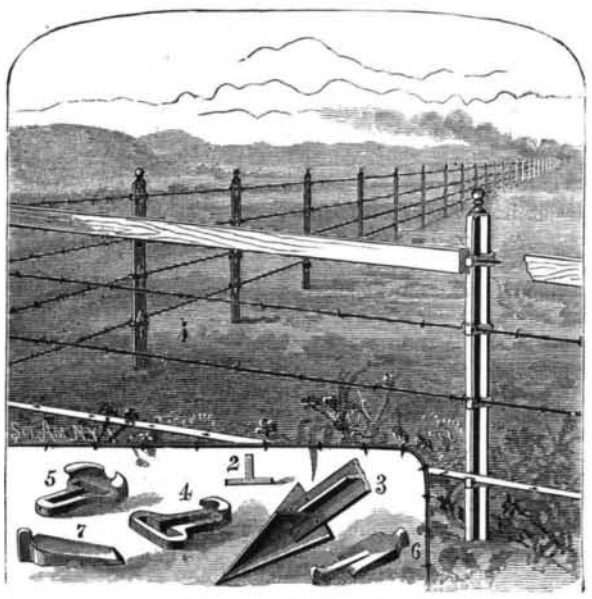
IMPROVED FENCE.

We give herewith an engraving of an improvement in fences for farms, railroads, and all inclosures requiring a light, easily constructed, and inexpensive fence. The principal novelty in this invention is the post and the fastenings. The post is made of rolled T iron or steel, with flanges riveted to the lower end to give it a firm bearing in the soil. The flanges are triangular, and form a pointed shoe (as shown in Fig. 3), which may readily be driven into the ground. This post, while very light, possesses ample strength for resisting any strain to which it is liable to be subjected. The post may be made of a single bar of T iron, or it may be made of two flat bars arranged at right angles to each other and clamped together by the clamps used to secure the wire to the posts.

The barbed wires or bands or board strips used in forming the panels are all secured in place either on the flat or ribbed side of the post by means of the clamp shown in Figs. 4 and 5, and the keys shown in Figs. 6 and 7.



POWELL'S IMPROVED FENCE.

The clamps are each provided with a recess for receiving the wire and clamping it securely against the post, so that it cannot be lifted out of place.

Any kind of barbed or plain wire or barbed or plain strip may be used in connection with the post, and, if desired, wooden rails may be used, the rail at the point where it comes into contact with the post being chambered out to receive the end of the clamp, and a wire being placed across the chamber thus formed, to be received by the clamp.

The corner posts of this fence are supported by an internal brace, and the lower posts, in long stretches of fence, are furnished with an extra stay, to keep them from being drawn out of the ground.

This fence is readily put up, is very cheap, and at the same time durable. It is capable of being adapted to door-yards, lawns, etc., and, when nicely painted, has a light and attractive appearance.

Further information in regard to this useful invention may be obtained by addressing Mr. T. S. Peck, Burlington, Vt.

VERNIER AND MICROMETER CALIPERS.

The instrument shown in the accompanying cut is designed for use in shops where great accuracy in measurement is requisite. The object of the apparatus, which is the invention of Mr. Aug. Cuvillier, is to measure with exactness to the hundredth of a millimeter, not only slight thicknesses, as is done with the metal gauge, but also great thicknesses, as is done with the vernier calipers. Mr. Cuvillier's objection to the latter is that they are wanting in accuracy, owing to the fact that the vernier gives only tenths of millimeters, and that the eye often fails to recognize the division on the vernier that coincides with one on the rule. Such a criticism appears to be exaggerated; for, when the division is correct, and when the marks are sufficiently distinct, unless an observer be far-sighted, he can not only read the tenths, but can also readily estimate the twentieths of a millimeter.

Moreover, were such an instrument as this provided with a vernier giving the twentieths of a millimeter, and a stationary lens of five to six centimeters focus, there might easily be obtained, by estimate, fractions up to nearly a hundredth of a millimeter. However this may be, Mr. Cuvillier has had no desire to have recourse to such an optical amplification, which might perhaps render the instrument too fragile, but has sought a method for reading the hundredths of a millimeter on a scale having wide divisions. He has solved the problem as follows:

His instrument consists of a rule which is divided into millimeters and along which slides a box carrying a movable arm. On this box, instead of a vernier, there is traced a simple datum point, designed to be brought opposite any point whatever of the division of the rule. A set screw permits of the box being secured at any part of the rule. At the extreme left of the latter there is fixed a cylinder which performs the role of a stationary arm, and which consists of two pieces—a steel axis fixed to the rule, and a steel sleeve which revolves on such axis. The aperture in the sleeve is made eccentric by a half millimeter with respect to the external cylindrical surface, so that at the two extremities of a same diametral plane, the thicknesses of the sleeve differ by one millimeter.

It results from this that if, after setting the sleeve so that the generatrix corresponding to the least thickness is in contact with the movable arm, the sleeve be given a half revolution, the greatest thickness will come opposite the said arm, which then will have to slide back one millimeter. But, during the half revolution of the sleeve, the backward movement will have been progressive, and will have passed through all the values comprised between 0 and 1 millimeter. The values of these displacements are read upon a disk, which is fixed to the base of the sleeve and centered upon the axis, and which carries an equally divided scale, each division of which corresponds to a displacement of a hundredth of a millimeter. The reading on this division is effected by the aid of an index fixed to the rule. Measuring with the instrument is performed as follows:

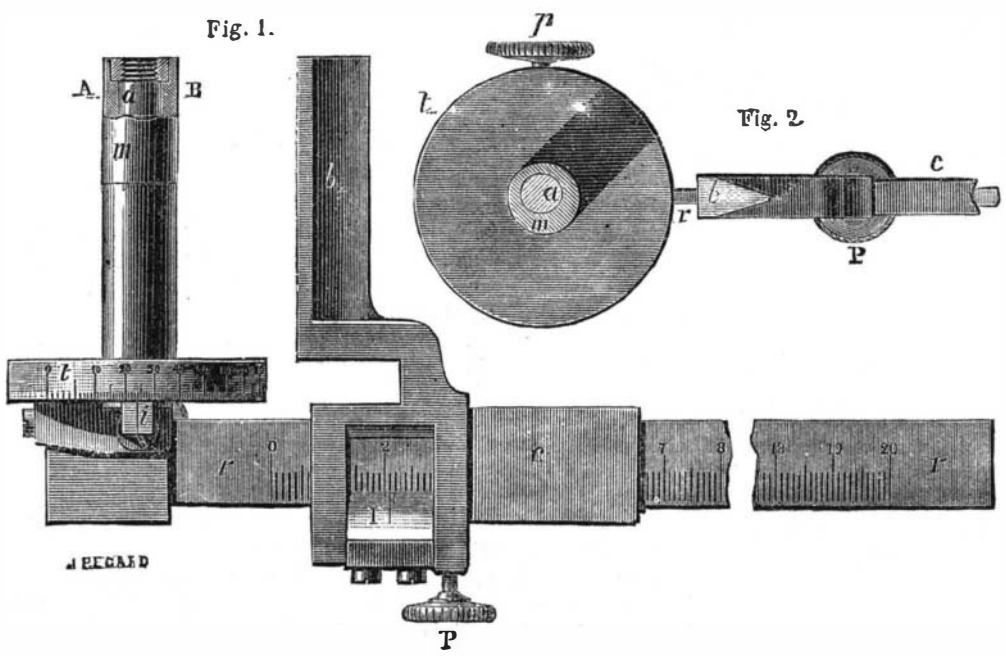
The division 100 of the disk is placed opposite the fixed index, and then the box of the sliding arm is fixed in such a way that its index is opposite a division of the scale, and that the distance of the arms exceeds by less than one millimeter the size of the piece to be measured.

Afterward the sleeve and disk are turned until the piece is slightly grasped between the two arms. Then opposite the datum point of the disk there is read on the scale of the latter the number of hundredths of a millimeter that must be added to the entire number of millimeters indicated on the rule by the index of the movable arm. The reading of hundredths is effected, moreover, without hesitation or fatigue; for each of them corresponds on the disk to an interval whose minimum is a half millimeter.

The instrument will be more readily understood from the following description of the figures:

Fig. 1—Elevation. Fig. 2—Plan and section in the direction AB. *r*, steel rule divided into millimeters; *c*, brass box which slides on the rule or bar; *b*, movable steel arm brazed to the box *c*; I, index that may be set opposite any one of the divisions of the rule, and which is flanked by two small divisions which are equal, and less than one millimeter. A comparison of the distances between these divisions and two divisions of the rule insures of accuracy in the concordance of the index, and of the corresponding division of the rule. P, set screw for holding the box in any desired position; *a*, steel axis of the stationary arm fixed at the extremity of the rule; *m*, steel eccentric sleeve revolving about the axis, *a*; *i*, a graduated disk, brazed on the sleeve and centered upon the axis, *a*. According as the divisions on this disk, which are numbered from 0 to 100, are brought opposite an index, *i*, the distance from the surface of the sleeve to that of the movable arm is either equal to the number of millimeters read by the index, I, or a unit greater than such number.

When another division of the disk is opposite *i*, the number corresponding thereto indicates the number of hundredths of a millimeter that must be added to the reading made at I, in order to have the actual distance of the two arms; P, a set screw, acting on a collar placed at the base of the micrometer disk and centered on the axis, *a*. This permits of fixing the disk in any position whatever.



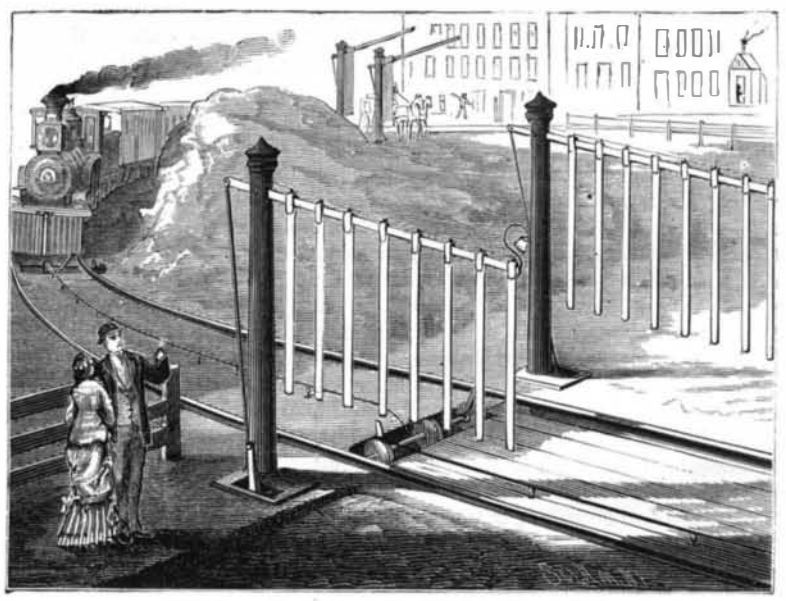
VERNIER AND MICROMETER CALIPERS.

NEW RAILROAD SIGNALING APPARATUS.

We give an engraving of an improved signaling apparatus designed to give at railroad crossings an unmistakable indication of the approach of a train.

The illustration shows the apparatus in its normal condition in the distance, while in the foreground it is in signaling position, having been operated by the approaching train.

The invention consists of a series of rock shafts secured below the railroad rails parallel with the cross-ties, the shafts being provided with levers that project upward in position to be engaged by the locomotive, and the rock shafts being connected with the signaling apparatus by wire ropes or rods, the signal arm is thrown down at the crossing as the locomotive passes over the lever of the rock shaft. There are three rock shafts to each signal, one connected directly with the signal arms by means of short rods, the others placed at opposite sides of the signal and at a considerable distance from it.



ELY'S RAILROAD SIGNALING APPARATUS.

A train approaching the apparatus strikes the first lever, thereby partly rotating its rock shaft, which, by its wire rope or chain connection, turns the middle rock shaft connected directly with the signal. This throws the signal arm into a downwardly inclined position, when the pendants, which were bunched together near the post, slide downward along the signal arm and arrange themselves at equidistant points along the length of the arm, the distance between them being regulated by a cord attached to the top of each.

This device forms a yielding barrier that is plainly visible, and at the same time will give way should a frightened animal try to pass through it.

This barrier is not intended to close the roadway entirely, as it extends only about two-thirds the way across the road. When the locomotive reaches the lever connected directly with the signal, the signal arm is raised, and the pendants slide by their own gravity downward toward the post which supports the arm.

The operation of this apparatus is the same when approached from either direction; and it not only gives the visible signal, it gives an audible signal by means of the bell hung by a very flexible spring at the end of the signal arm. When the arm drops this bell rings for a considerable time. Further information in regard to this useful invention may be obtained by addressing Mrs. Horatio Ely, Jr., Black Mills, Monmouth Co., N. J.

Tunnels on the North Pacific.

Chief Engineer Anderson, of the Northern Pacific Railway, gives the dimensions of the tunnels on that line as follows: At the Big Horn, 1,100 feet, now completed; through Bozeman Pass, 3,600 feet; at the Mullan Pass, near Helena, 3,650 feet; at the Mullan grade, 500; and at the Blackfoot, 500; in all 9,350 feet. The heaviest work is at the Bozeman and Mullan Passes.

To Plug Leaky Boiler Tubes.—If the leak is near the head, fit and drive in a short ferrule; if the leak is in the body of the tube where a band cannot be bolted around it, take it out and put in a new tube.