ings which are cut in the said tube, to expose the divided pin to view. A small brass pin i screwed into the steel centre pin at its lower end, prevents the tube from sliding off altogether, should we inadvertently omit to tighten either of the clamp screws. The point j,—the tip of which is level with the underside of the ball support *O*, when the slide is closed up tight against the projecting head of the pin P and the index on the tube is opposite the 0 on the pin,—can be lowered by 0·10 foot or 0·05 yard at a time, by adding extension rods r provided for the purpose. The steel pin is bored out in the centre and contains a hollow spring bolt which is terminated at its upper end by a barrel shaped head that causes the three prongs into which the bolt is split to close up when forced up or down through an appropriately tapered opening turned in a steel bushing inserted in the centre of the lower parallel brass plate under the level l.

The ball support *O* of phosphor bronze, 0·10 foot or 0·03 yard high, already referred to, has been added to the rod for use in connection with a cast iron foot plate *F* having a cavity turned on top about 0·138 foot diameter and 0·033 foot deep, which forms part of a sphere of 0·09 ft. radius. This support is kept in place by a tapered brass pin q which passes through one side of the brass shoe, the wooden rod and the brass shank of the ball and is screwed at the other end into the opposite or rear side of the shoe. The pin being made with a taper, presses the shoulder of the ball tight up against the flat end of the shoe every time, without fail.

The ball is not inserted in the rod so as to be precisely in the centre between the front and rear faces of the shoe; but with its axis 0·067 foot back of the divided face. The sum of this distance and the horizontal projection of the interval between the centre of the tacheometer and the centre of the axis of revolution of the telescope, viz., $\frac{1}{2}\ r=0{\cdot}333$ foot, gives us for the constant to be added to the distance—centre of tacheometer to axis of rod—the round number 0·4 ft.

Should it be found desirable to use convex headed pins and stakes and nails for supporting the rod, instead of placing it in a spherical cavity on a cast iron foot plate, the ball support can be removed and a shank *V* with disc fitting exactly the hole in the bottom of the shoe, substituted; if preferred, truncated pyramids of hardened steel can, of course, also be inserted in the shoes to be used as supports, as practised on the United States Geological Survey.

For tacheometrical operations, in general, the use of a foot plate with a spherical cavity in connection with a corresponding ball support on the rod, is however, calculated to give the best results. For, a rod with such a support placed on the concave surface of a spherical segment must necessarily, when held up plumb, always have its longitudinal axis in one and the same vertical, so long as the plate remains undisturbed, no matter in what direction the face of the rod may have to be turned, or how many times we may have to remove it from the plate before the work is completed from a station.

The same cannot be said when a rod with a flat base is used in connection with convex headed nails or turtle back foot plates, when the rodman can barely help shifting his rod latterly more or less, at every turning point. In taking directions or measuring horizontal angles with the tacheometer, the rodman is instructed to