so as to break up the individual grains and form a transparent gelatinous mass, afterward diluted with water, so as to afford a complete mixture with the solution of the enzymes. The second hypothesis seems reasonable, since we already know that different sugars perfectly soluble are nevertheless quite differently susceptible to the action of ferments and enzymes, and the reason is traced directly to their isomeric condition, i. e., to different molcular constitution. There is certainly nothing improbable in the thought that a similar variation or isomerism exists among starches. Should this explanation, which now seems the only reasonable one to offer, be correct, the theoretical value of the observations presented will quite equal or exceed any practical application they may possess, since the possibility of isomeric starches has not heretofore been entertained.

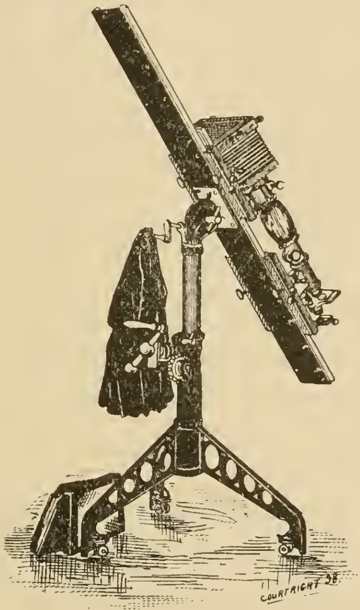
A New Photo-Micrographic Apparatus. By A. W. Bitting.

While it is possible to make excellent photo-micrographs with simple apparatus, a microscope, a camera with a ground glass and a few books cr blocks to make the necessary adjustments, such arrangements are inadequate for laboratory work. To meet the needs of the laboratory many forms of apparatus have been devised, some of which are admirably adapted to the particular work for which they are intended. Most of them have a limited range of adjustment and not well adapted to all kinds of work.

The object of the writer in constructing a new apparatus was to get one more nearly adapted to all laboratory conditions than is now provided.

The requisites of a good photo-micrographic apparatus are rigidity, ease and accuracy of adjustment and adaptibility to all kinds of work. The first condition has been met by using metal in the construction, thus obviating shrinking, swelling and warping, inherent qualities of wood. The second and third requirements have been met in the mechanical construction.

The cut shows the stand in working order in the inclined position. The apparatus consists of an upright cast-iron post supported by three cast legs. The center of this post is bored out to receive the elevating post. Near the top is a sprocket wheel, which is turned by a screw and crank. A binding screw is also placed in the top to clamp the elevating post in position. The upright post, with its legs, stands 28 inches high. The elevating post is 28 inches long, is of two-inch steel tubing, turned to fit the hole in the upright post. A series of holes are drilled into the tubing to receive the sprocket wheel, which raises and lowers it. Upon top of the elevating post is a head-post which receives the bed plate for carrying the camera and microscope. The head-post is turned to exactly fit the inside of the tube and permits the bed plate to be revolved on its horizontal axis. The bed plate is five feet long and five and one-half inches wide. It consists of a piece of three-sixteenths-inch rolled steel, to which is rivited



two dressed half-inch steel tubes. These tubes are placed near each edge and give rigidity as well as serve for guides for the camera and microscope carriages. In the center of the bed plate is a rack for the adjustment of the camera and microscope.

The attachment of the bed plate with the head post is by two dressed circular surfaces and a bolt. Upon the head post is mounted a screw which turns in threads cut upon the edge of the circular plate attached to the bed plate. By loosening the bolt and turning the crank upon the end of the screw the bed plate may be made to rotate upon its vertical axis.

The carriages are twelve inches long, grooved to fit upon the steel rods, and are provided with pinions, cranks and binding screws to make accurate adjustment. The stand is provided with castors so adjusted that it may be thrown on or off its legs with the foot. All the handles are nickel-plated and the whole apparatus enameled black.

With this apparatus it is possible to work in the vertical or horizontal position or at any inclination. The adjustment is easily and quickly made by loosening the binding nut between the friction plates and turning the bed plate to the desired position. The bed plate can be rotated on the horizontal axis to get the advantage of room and direction of light without moving the stand upon its legs. When the bed plate is turned to the horizontal the top of the bed plate is 33 inches from the floor; too low to work with comfort. By raising the elevating post the bed plate may be carried up to the height of five feet. This adjustment makes it possible to always have the work at a comfortable height, either in the sitting or standing position, and regardless of the stature of the operator.

The apparatus has been used for some months in the Veterinary Laboratory of Purdue University. A Zeiss microscope and a long-focus premo camera are mounted upon the carriages (any other microscope and camera can be mounted as easily), and photographs have been taken of parasites, histological sections and bacteria. It has been used in all positions, with fresh and permanent mounts, and the results are entirely satisfactory.

The stand was built by C. W. Meggenhoffen, of Indianapolis.

An Infinite System of Forms, Satisfying the Requirements of Hilbert's Law. By J. A. Miller.

Let Z represent the totality of homogeneous integral forms of four variables (excluding those which vanish identically) which are unchanged by the group of linear substitutions generated by the operators.

$$
\begin{array}{llll}
S: & Z_1' = Z_2 & \text{and } T: & Z_1' = Z_4 \\
 & Z_2' = Z_3 & & Z_2' = -\varepsilon^3 Z_3 \\
 & Z_3' = \varepsilon^6 Z_1 & & Z_3' = \varepsilon^6 Z_2 \\
 & Z_4' = Z_4 & & Z_4' = -Z_1
\end{array}
$$

Where $\varepsilon = e^{\frac{2\pi i}{9}}$