Measuring Rate of Evaporation

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A NEW apparatus for measuring evaporation is shown in Fig. 1. A pan *A* contains the material from which evaporation is to be measured; this may be sand, soil, grass, water or other material. The pan *A* is supplied with water through a per-

FIG. 1. Evaporating pan *A*, sand in pan *S*, gauze *J*, gravel *M*, connecting tube *C*, well *B*, port for air and water *F*, air channels *H*, socket of glass tube *D*, graduated tube *E*.

forated tube *C* from a graduated glass tube *E*, which acts as a reservoir. The supply is so arranged that the level of the water table in the pan *A* is maintained constant, while the water required to do this is measured on the glass tube *E*, in millimetres of depth over the pan *A*. Thus, if the pan has a diameter of 10 cm. and the tube *E*, 2 cm., 1 mm. over the area of the pan will mean 25 mm. change of level in the tube. The pan may be of any convenient size to suit the desired conditions, and the bore of the tube *E* will then determine the magnification.

This is the basic principle of the apparatus and it is put into operation thus: the tube *E* is fixed in a socket *D* which fits into the top of the well *B* widened for the purpose. The socket *D* is prolonged downwards into the well *B* by a smaller tube, about 1 cm. bore. This prolongation is formed of two thin-walled tubes, one of which fits outside the other. The outer of these is closed at the bottom and has a slot, like in a wood screw, across its bottom.

The inner tube is open below. A port *F* is cut through the walls of both these, so that if the outer tube be turned round over the inner, the port *F* can be opened or closed. A projection on the floor of the well which engages in the slot in the bottom of the outer tube permits *F* to be opened or closed, while the graduated tube *E* is in position on the well.

Starting now with no water in the instrument and the pan *A* full of sand, the graduated tube is lifted out of the well. The outer tube or sleeve on the bottom projection is drawn off and the glass tube filled through the open end of the inner tube. The outer tube is pushed on over the inner and turned to close *F*, after which the glass tube is replaced in the well, turned to open *F*, when the water will run out and into the pan, bubbles of air entering through *F*. Air is admitted to the well by three vertical channels *H* round socket *D*. As soon as the water level reaches the top of *F*, no air can enter and the level remains fixed at this. If evaporation from the pan lowers the water in the well *B*, air is allowed to enter through *F* until the level is restored; thus a constant level is maintained. When starting, water may be put direct into the well until the sand is saturated and the water just covers the mouth of tube *C* in the well; the rest can be added as above.

After evaporation has gone on for some time and the tube *E* is nearly empty, it may be refilled by turning in its socket through 180° to close *F*, lifting out, removing outer sleeve and filling the tube. *F* is again closed by turning the outer sleeve, the tube *E* replaced gently in well, turned through 180° to open *F*, when the measurement can be continued without interruption. When measuring evaporation, the instrument should be on a level base and must not be moved, or if this is necessary, the opening *F* must first be closed and not opened until after moving and placing on a level bed. If this is not done, water may run from well to pan and admit air to the tube *E*.

Fig. 2 shows results obtained with this apparatus.

FIG. 2.

Evaporation, when rapid, can be measured over very short periods. The nature of the surface can be varied, also the material may be loose or compact. The effect of depth of water table from surface can be investigated by raising the pan or by adding loose rings; much other useful information, not hitherto easily obtainable, may be gained.