the 4-foot vane is 6 inches higher. The wind-direction contact box, about 3 feet from the floor, is left open for examination. The battery wires pass from the hollow support pipe under the floor to the triple register 15 feet away.

Nearby is a table carrying a model farm residence properly wired for lightning protection according to plans and specifications by A. J. Henry. Five dry cells and a spark coil such as is used in amateur wireless telegraphy, connected with the house wiring system and with a wire having a loose end, permit an attractive demonstration with this exhibit; when the loose end of the wire is brought near the tips of the lightning rods or any part of the house wiring system, a stream of crackling sparks will jump an air gap of about 1½ inches, and by a slight manipulation several streams of sparks may be produced, resembling lightning in appearance.

The major parts of the Marvin pyrheliometer, equatorial mounting, also stand on this table; the readnig telescope, scale, galvanometer, and other delicate parts are in a closed show case nearby. A photographic sunshine recorder, shown with exhibit base, is also on this table.

A low stand, 18 inches high and 3×6 feet in size, carries the model storm-warning tower, with its lanterns and the weather flags, the appropriate weather flags (small size) being displayed for to-morrow's weather forecast. The flags are about 17 feet from the floor. Small 6-inch models of electric storm-warning lanterns are about 12 feet from the floor and may be lowered for examination. A small brass model of the new Marvin shielded rain-and-snow-gage, one-fifth actual size, is mounted on the same stand.

A screen for displaying photographic prints is near the wind instrument tower. It has two surfaces about 6 by 6 feet in size for large illustrations and 12 views are shown. Nearby is an autoprojectoscope for automatically projecting lantern slides continually; a large leather upholstered settee in front of this picture machine invites visitors to rest a while. The views shown are about 2 feet square, each view being exposed about 15 seconds, though with a push-button cord any slide may be held as long as desired. Appropriate explanatory slides accompany each view or series of views, there being at least six views of every branch and special feature of the Bureau and its work.

At the southwest corner of the space is an exhibit transparency stand having two show cases beneath the transparency frame. (See fig. 1.) One case contains textbooks and Weather Bureau publications, with climatological statistics or averages for practically all parts of the world. The adjacent show case contains the Marvin nephoscope, complete; a kiosk aneroid barometer, and the same showing works only; a pocket aneroid barometer; the kite meteorograph, and the balloon meteorograph with extra aluminum sheets for records. All show cases are plush-lined, and have glass panels on sides and top.

A similar display stand with show cases is at the northwest corner of the space; one case carries the pyrheliometer parts, a short range thermograph (metal coil pattern), two ordinary thermometers, a maximum and a minimum thermometer on a Townsend support, a hand sling psychrometer, and a regular station whirling psychrometer, with shortened handle, and no support. The other case contains a Lambrecht's hygrometer, Marvin's kiosk hair hygrometer, a burette tube, an electric sunshine recorder, Lind's old style anemometer, a small zero-setting anemometer for light air movement, electrical contacts for wind direction registration, a Marvin kite anemometer complete, and a regular station anemometer with cups, these instruments having been taken apart when necessary to show them in the case.

Between the transparency stands, on the main aisle, is the Bosch-Omori seismograph in an exhibit case. The seismograph pen vibrates continually with the minute movements of the floor, though the record is not traced. Enlarged copies of records of the San Francisco earthquake in 1906, and others, are shown in the case. The pens, drum, and time-marking devices shown are by Marvin.

The Marvin box kite is suspended by a wire about 15 feet overhead and carries an empty aluminum meteorograph case. A sounding balloon is also suspended similarly, the empty meteorograph basket, attached properly to the overslung parachute, being just above visitors' heads. The balloon is inflated with compressed air. (Fig. 1.)

A display fixture containing 24 wing frames, providing for 96 surfaces, 22 × 26 inches in size, for photographs, charts, and maps, is placed against the back of the glass weather map. On this fixture, and on the picture screen, transparency stands, and lantern slide projector already mentioned, are shown several selected views each, of Weather Bureau buildings, mountain snow scenes, wireless stations, kites and balloons in use, cooperative stations, instrumental exposures at stations, many special single instruments where the instrument is not exhibited, river and flood views with river gages, the Wagon Wheel Gap (Colo.) experimental work, also the similar work at Ephraim, Utah, the frost work in the fruit regions, and in the cranberry marshes, copies of automatic records of special or historic storms, cloud and fog forms and types, snow and ice crystals, forecast verification map, West Indies storm tracks and Panama Canal sailing routes, long record precipitation charts, maps of all regular and special stations of the bureau, the corn, wheat, cotton, and other special services; consecutive series of Washington weather maps; series of the Northern Hemisphere maps; foreign weather maps; special diagrams of precipitation distribution by months at selected stations; the snow survey work in Utah; special storm views, showing tornado damage, waterspouts, hail, and damage thereby, lightning photographs and lightning effects, deep snow views, ice gorges in streams, vessel warning stations, vessel reporting service, coast storms and effects and other miscellaneous views.

Two stereoscopes each contain 48 views of the work in the central office of the bureau, the work at a typical climatological station (Salt Lake City), the snow measurement work with the Marvin tube and shielded gages, the cooperative experimental station at Ephraim, Utah, some river views, and a number of cooperative stations. (Fig. 2.)

CLIMATOLOGICAL STATIONS AND LOCAL AUTHORITIES.

We print below remarks by the director of the British Meteorological Office addressed to the local pride and local interests of Great Britain and Ireland. Probably the conditions of the time rather than the natural course of evolution of meteorological work, have influenced him in this case. The best interests of meteorology and of climatology require that so far as possible the equipment, installation, inspection, and observing methods be under a single centralized control. Only under such conditions can science be assured of that degree of reliability, uniformity, and homogeneity which is the prime essential

in all meteorological work. World meteorology has always suffered from lack of homogeneity due to national lines of division; that gigantic undertaking of the 70's and 80's the "International simultaneous observations" under the direction of Gen. A. J. Myer, was not altogether perfect in this regard. Even within the limits of a nation observations will not be uniform and comparable unless under a centralized control. It is not often that the United States passes through a phase of national development earlier than does Great Britain; but in this case we actually seem to have done so. Our country has had its experience with State and other local weather organizations with the result that local pride or local interests did not prove strong enough to maintain the work in adequate form, with one or two noteworthy exceptions.

Strange to say, it may be safely opined that Dr. Shaw's appeal would not find any response in the American public consciousness. Here we seem to lean more and more strongly toward governmental financing of all undertakings, no matter how pronounced their local value and bearing. Of course, in certain lines, such as metropolitan rainfall réseaux, local corporations have shown initiative and energy of their own; but they seem to have been forced into such work by Dame Nature rather than to have undertaken it from any sense of pride in securing a knowledge of their locality.—C. A., jr.

MEMORANDUM BY THE DIRECTOR OF THE METEOROLOGICAL OFFICE.[1]

[Signed: W. N. SHAW, London, Apr. 27, 1915.]

In the present emergency in national affairs the Meteorological Committee desires to call attention to the position of the Meteorological Office in relation to the collection of observations from what are technically known as "climatological stations;" that is to say, from stations which are maintained, not by the office in connection with the public daily service of forecasts and gale warnings, but by local authorities or private persons. They contribute observations to be used by meteorologists for the study of the details of climate and weather in the British Isles, and by the public who require information about the weather for various purposes.

The Meteorological Office is a central depository of transcripts of meteorological observations of various kinds in every part of the British Isles, of the British Empire, and indeed of the whole world, not because the information is essentially necessary for or immediately applicable to the work of forecasting and the study of daily weather which, so far as observations on land are concerned, are its primary duties, but because an organized central storehouse or memory of the experiences of weather for a long series of years is of great public utility and more effective than any compilation which otherwise individuals would be able to make for their own use. By agreement between the office and the Scottish Meteorological Society the Meteorological Office, Edinburgh, discharges a similar duty with special reference to Scotland.

In the course of the past 20 years a large amount of valuable information has been compiled, the existence of which is hardly realized. It is still far from complete, but I may be permitted to illustrate the usefulness, or at least the appositeness, of an efficient public memory by recalling a report which I happened to see some years ago in the Westminster Gazette, of a lawsuit in which a tobacconist sued his neighbor for damage to a case of cigarettes, alleged to be due to rain coming through a broken skylight. It was acknowledged that the skylight was broken by the neighbor's son and, according to the report, "all went well until a mild-mannered gentleman from the Meteorological Office" proved that it had not rained since the skylight was broken, and the plaintiff's case had to be abandoned.

In order to be effective the collection of information should be carefully organized. The preservation of a trustworthy and sufficient memory of past weather is primarily a matter of urgent local importance. The weather is an element in the profit and loss account of every individual, of every parish, of every district, whether urban or rural, of every county, and of every State; and the preservation of an efficient record of these events is just as important for the persons or authorities concerned as the record of the money transactions in which they are engaged. The difference between the two sets of experiences is that one is beyond the control of the individual or local authority and the other is not; but no steward of his own or other people's interests would be regarded as wise if he left out of account the gains and losses which he could not control.

The question of meteorological observations, or weather records, may be put in this general form: Here is a spell of rain which the house gutters, the local drains, the roads, gulleys, and streams have to carry away; a snowstorm which may make the neighborhood impassable; a hailstorm which damages the crops; a drought, or a long frost, which endangers the water supply; a wind which brings down all the loose tiles and chimneys. Are these events to be regarded as normal and to be provided against by suitable precautions, or are they outstanding risks which should be left to chance?

Only by an adequate public memory can an answer be given, and hitherto the provision of the material for an answer has been left mostly to private enterprise. The claims of science have usually been urged as an encouragement to private enterprise, and without doubt such observations are indispensable for the scientific study of weather; but they are equally indispensable for the proper conduct of the ordinary affairs of life. Since the study of weather began to be organized on a scientific basis, circumstances have changed. The life of the individual and of the community is not nearly so self-contained now as it used to be; it is much more dependent upon facilities for communication with the rest of the world. The increase of those facilities enables the experience of many to be used for the advantage of each in a far greater degree than was possible in the olden days.

To take an example, the practice of insurance is far more widely spread than it used to be. Taking the case of insurance against hail, the premium should be different according to the locality; but so far as is known the localities in their corporate capacity keep no records, and in consequence the premium is fixed for them upon information privately compiled by the insurance companies; that is to say, by one of the parties to the bargain. Many other forms of insurance against weather are possible, but only when the risk can be properly computed by means of ascertained facts. This Office has recently been concerned in a legal dispute as to whether damage to property during a squall of wind accompanied by incessant lightning was directly due to the wind or to the lightning. A fine distinction, upon which the validity of the insurance turned, and which suggests some revision

[1] *Reprinted from* Tenth Annual Report of the Meteorological Committee . . . for the year ended March 31, 1915 (the 60th year of the Meteorological Office). London, 1915. pp. 75–78.