minutes later. No phenomena worthy of note were seen between third and fourth contacts. The lapping of the limb of Venus over that of the sun gradually but steadily decreased, until the final separation was observed with great accuracy for such a phenomenon. Soon after the last contact, the entire apparatus was again carefully examined, and the necessary observations made to determine the errors of the chronometers. All the measures were made, also, for determining the exact position of the photoheliograph.

The dry plates were developed in a few days; and 146 dry plates and 30 wet ones were sent to Washington, all of which can be easily measured. Two dry plates were exposed in the forenoon, when the clouds were too dense, and no images were obtained; and two others were accidentally broken.

In the observations of interior contacts there was no trace of any tremor or fluctuation of the light in the cusps, as they closed around the limb of Venus; and it is almost needless to say, that there was no trace of a shadow or a black drop or ligament between the limbs at second and third contacts. The probable error of the second and third contacts was estimated at 0.3s.; for fourth contact, 0.5s.

Observers of transits of Venus and Mercury have written so much in regard to the obstacles encountered from the apparition of the shadow or black drop between the limbs of the two bodies at *second* and *third* contacts, and so full has been the testimony in favor of the existence, and the almost necessary occurrence, of this phenomena, that, at the transit of Mercury in 1878, many observers claimed, as evidence of their skill, that they *did* see it, while others less fortunate apologized for *not* seeing it. Observers of the black drop were so generally confined to those with imperfect apparatus, or to those unaccustomed to observations of the sun's limb or disk, that the true nature of the obstacle was pretty well understood before it was carefully investigated. It is now quite well settled, that the 'black drop' is due to bad eyes, imperfect apparatus, or the inexperience of the observer. With good eyes and proper apparatus, a good observer never should see the black drop: for, when it is seen, there is something wrong; it is a spurious phenomenon.

A TELEPHONIC TIME-TRANSMITTER.

Among the various methods of distributing time, the telephone affords one commendable for its simplicity. Its use for this purpose does not seem to be generally appreciated, and I know of only one contrivance adapted to it other than the one to be described. This one can be called a time-transmitter from its resemblance in appearance and action to the Blake transmitter in ordinary telephones. It is the invention of Mr. C. W. Ruehle of Detroit, and has been in use at the observatory at Ann Arbor for about six months. Its behavior is in every way satisfactory.

Its general character can be seen from the accompanying figures. Fig. 1 is the face view of the transmitter. At *a*, *a* are the binding-

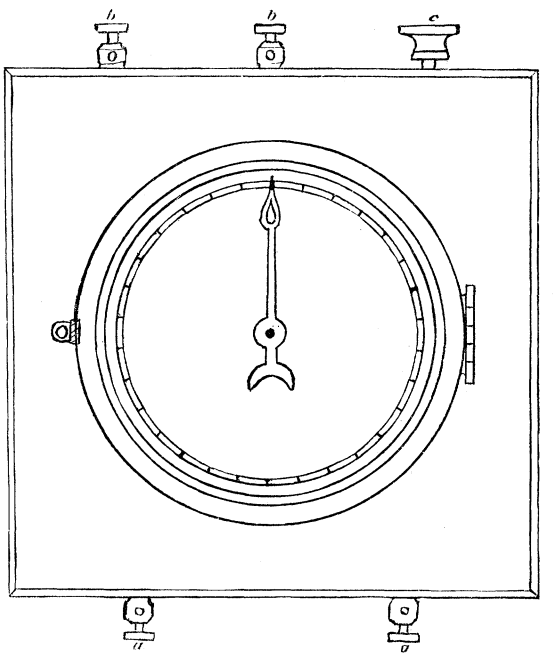

Fig. 1.

posts for the wires from the battery; *b*, *b*, those for the wires of the telephonic circuit. Between the latter is a switch, not represented in the drawing, which enables the operator to cut out the telephone circuit when any thing goes wrong. *c* is a button, by pressing which the instrument can be set going. When started, it runs for two and one-half minutes, during which time the hand in the centre completes a revolution. At the end of that time it stops, and can be started again only by pressing the button.

In Fig. 2 we have a view of the interior. We have here ordinary clock-work, with the addition of a Ruhmkorff coil at *d*, the unlocking part *e*, a circuit-breaker at *f*, and an intermitting-wheel *g*. This wheel moves to the right.

As it turns, the radiating bars on it are brought to a vertical position one after the other; and, while passing this position, they raise the lever suspended above, and, by the action of the pin at its end, keep the circuit open. They are so placed and gauged that they hold the circuit open from 55 to 60 seconds of the first, and then of the second minute.

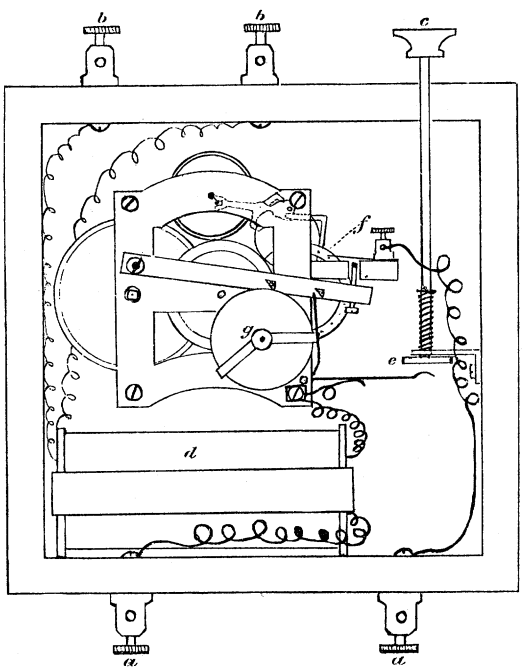

FIG. 2.

Each break in the primary circuit causes a distinctly audible sound in the ear-telephone. This sound is so loud that I have sometimes heard it across the room. As the circuit is broken each second for the first fifty-five seconds of each full minute, and for the full thirty of the last half-minute, the time-transmitter gives a series of seconds signals easily received at any telephone in connection with it. The intermission of five seconds at the end of each full minute serves to notify the receiver that the next minute is about to begin, and thus saves him the trouble of counting.

In using the time-transmitter, the person who desires the time calls me up by telephone, and I start the transmitter at the beginning of some minute by his time. The correspondents are usually jewellers, and do not need to be told the minute at which the transmitter began. If they do need the minute, it can be given them verbally by the Blake transmitter. The succession of beats and intermissions gives the receiver four opportunities for comparison; viz., the beginning of the first, second, and third minute, and the end of two minutes and a half.

An important feature of this method is its capacity for transmitting time to several or many persons simultaneously. In order to test this, Manager Keech of this place obligingly called up all the exchanges connected with us. Some did not respond; but those who did — a dozen or fifteen in number, and distant in all directions from ten to seventy-five miles from us — all heard the beats of the transmitter distinctly, except at Port Huron. From this and some other tests, I concluded, that, by this method, the time could be received by at least twenty-five telephones simultaneously.

M. W. HARRINGTON.

PARENTAL INSTINCT AS A FACTOR IN THE EVOLUTION OF SPECIES.

IN a recent lecture at the Sheffield scientific school, New Haven, the writer called attention to the lack of maternal care as one of the probable causes, though usually overlooked, of the extinction of many of the large and powerful reptiles of the mesozoic age, and of the large mammals of the tertiary. The very small size of the brain and its low organization, in these early animals, are now well known, and we are justified in believing that their intelligence or sagacity was correspondingly low. They were doubtless stupid and sluggish in their habits, but probably had great powers of active and passive resistance against correspondingly stupid carnivorous species. But, unless the helpless young were protected by their parents, they would quickly have been destroyed; and such species might, in this way, have been rapidly exterminated whenever they came in contact with new forms of carnivorous animals, having the instinct to destroy the new-born young of mammals, and the eggs and young of oviparous reptiles.

Thus it would have come about, that the more intelligent forms, by the development of the parental instinct for the active protection of their young against their enemies, would have survived longest, and therefore would have transmitted this instinct, with other correlated cerebral developments, to their descendants. This mode of natural selection must always have been a very active one, wherever carnivorous mammals, birds, and reptiles, have existed in contact with herbivorous species.