by a crank, and set in motion by a weight of a hundred and fifty kilograms placed behind the building. A brake checks the disk. A clock-bell, regulated from within, notifies an assistant either to set in motion or to stop the disk.

Fig. 3 shows the interior arrangement of the chamber. The removal of one of the side-walls discloses the photographic apparatus, *A*, placed on a bracket, and directed toward the screen. This instrument receives the long and narrow sensitive plates, which just admit the image of the whole screen. The plates which give the best results for the shortest exposures are those of Van Monckhowen of Ghent, and that of Melazzo of Naples. At *B* is the revolving-disk, which produces the intermittent light; at *D*, a shutter, which is raised vertically at the beginning of the experiment, and falls at the end in order that the light may enter the apparatus only during the time absolutely necessary. *E* is a long slit which unmasks before the objective the field in which the movements to be studied are taking place. The darkness of the chamber permits one to handle at his ease the sensitive plates, and to change them for each experiment.

(To be continued.)

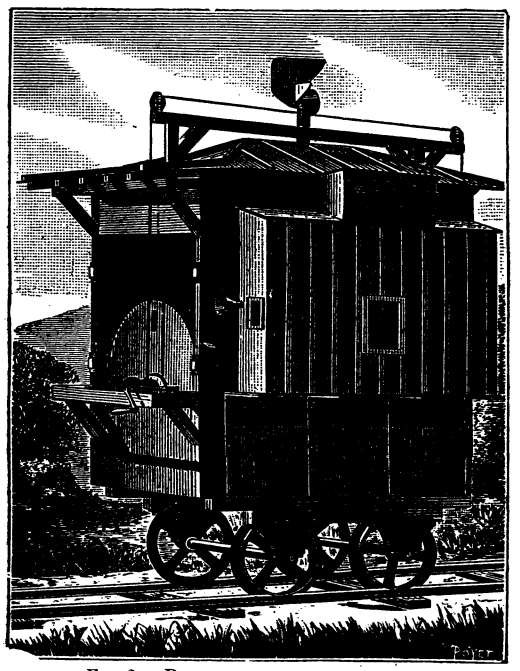

FIG. 2. — ROLLING PHOTOGRAPHIC CHAMBER.

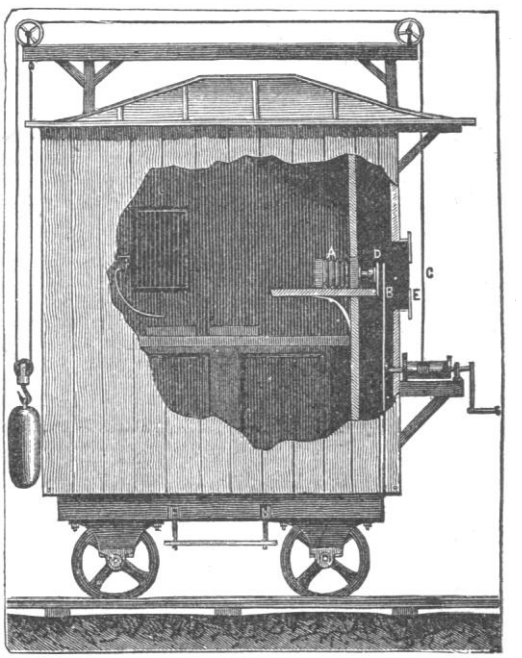

FIG. 3. — INTERIOR OF PHOTOGRAPHIC CHAMBER.

SEPTEMBER REPORTS OF STATE WEATHER-SERVICES.

THESE reports emphasize the general lack of rain, which, without exception, was characteristic of the weather prevailing in every state issuing reports. The low mean temperature is also made a subject of note.

Georgia. — In this state there has been no general rain since April 23, and the crop reports are in consequence unfavorable. Cotton averages sixty-two per cent, and corn seventy-six per cent, of the usual yield. The temperatures ranged between 45°, the minimum in the northern portion, and 95°, the maximum in the southern section. The average rainfall was 1.57 inches.

Indiana. — The temperature averaged 3.5° below the normal for September; and frosts occurred on the 6th, 10th, and 26th, damaging late corn and other vegetation. The prevailing wind was north-east. The rainfall ranged from 0.15 inch to 5.98 inches, averaging 1.99 inches for the state.

Kansas. — At Lawrence the rainfall was smaller and the temperature lower, with one exception, than any other September for sixteen years. Rain fell on seven days, and there was but one thunder-shower. The mean cloudiness was 40.33 per cent, the month being 0.31 per cent clearer than usual.

Missouri. — At St. Louis the rainfall was less than a hundredth of an inch, which has not happened before since Dr. Engelmann began his observations in 1839. The normal rainfall at St. Louis is three inches. Several other stations report no rainfall. Light frosts occurred, but without material damage to the corn-crop, except over limited areas on low ground.

Ohio. — The barometric conditions were normal; but the temperature was about four degrees below the

average, and the rainfall showed a deficiency of nearly an inch. The bureau is gradually increasing the number of stations, and makes special efforts to have its observers supplied with standard instruments. In addition to its regular stations, it invites the co-operation of voluntary observers, and will furnish reliable instruments at reduced prices. The rainfall chart published by this service is deserving of being introduced into other similar reports.

Tennessee. — The continued drought has damaged the crops, especially in the eastern portion; but in the middle portion the crops are in fair condition. Frost visited some localities, the temperatures in the state ranging from 32° to 95°. The prevailing wind was north; the average rainfall, 2.06 inches; the average number of clear days, 14.

LETTERS TO THE EDITOR.

Teaching language to brutes.

Is it not quite conceivable that some of the lower animals might be taught to use human language rationally? No doubt the reasons for a first hasty answer in the affirmative would be that the animals seem so intelligent as sometimes even to reason, and that they have, in fact, often had human words put into their mouths, and that they seem sometimes to have a language among themselves. Yet, after all, cannot their intelligence, and even wisdom, and occasional apparent reasoning, be satisfactorily explained, without attributing to them true reasoning, as the result of hundreds or thousands of generations of experience and transmitted memory, by which certain objects or actions become associated with a feeling of pleasure or pain that induces pursuit or avoidance? How few, indeed, are the cases that cannot readily be so explained, where an animal appears at first sight to exercise a reasoning-power! and how extremely simple the effort seems then to be!

True reasoning can always be reduced to the syllogistic form, in effect a statement that what is true of a class is true of something in that class. In order, then, to reason, properly speaking, it is necessary to use a general term (a word or sign with the meaning of a common noun) to indicate the class; and, as we do not know of any evidence that brutes have such words or signs, we have no proof that they can reason. In like manner, the lack of evidence that they can reason goes far towards showing that they have no language that includes such general terms, though it may be true that they sometimes understand words in a singular (not general) sense, and have similar expressions for their own feelings.

The question, then, is whether brutes may not be taught the intelligent use of general words or common nouns, which would enable them to reason. As the step does not seem so very enormous from the undeniable intelligence of some brutes to the lowest form of generalization, it is perhaps worth while to consider how they might possibly be taught to take the step, in hope, that, having once taken it, they might be led farther with still greater ease. Since the idea of plurality appears to lie at the very bottom of the idea of class, number would perhaps be the first and simplest step in generalizing, — number, that is, the regarding things merely as individuals or units. It is a step beyond, to regard things as alike in more complex respects. If that is so, the first effort might be made to teach how to count, and, of course, at the beginning only to count up to two. If that can be accomplished, still further counting can unquestionably be taught, and no doubt by degrees a much greater amount of generalization and reasoning itself. Does it seem impossible that a brute may learn to associate invariably the word 'one' with a single object, and 'two' with a pair of objects, no matter of what kind? At first the two objects should always be two like ones; but by degrees a difference in them might be allowed. The teaching of common names might next be taken up; or it might be begun along with the counting, but without the confusing addition of any plural termination. Even if the mere counting up to two could not be taught successfully to any single individual brute, yet the end might nevertheless be attained, perhaps, in several generations.

The question then comes, With what animal would it be best to begin such experiments, — whether with monkeys, or elephants, or birds, or ants? Of course, articulation is not essential; for a language of signs might be devised suitable to the animal, — a language corresponding to the deaf-and-dumb one of signs, or to one using the Morse alphabet, or something like it. Elephants are very intelligent, but so very long lived that it would take ages to observe the effect of training through many successive generations. Perhaps the convenience of excellent articulation and rapid propagation, both combined with apparently good intelligence, might give the preference, on the whole, to a talking bird, such as the Indian mynah. **L. B.**

Nov. 9, 1883.

Climate in the cure of consumption.

In your issues of Sept. 28 and Oct. 5, Dr. S. A. Fisk of Denver, Col., compares the climates of the principal health-resorts of the United States with one he happens to represent, i.e., Colorado. At the commencement of his paper the writer states that "he has given the data for Augusta, Ga., as the best substitute for Aiken, S.C., at which place there is no signal-station; and, in doing so, he thinks that he is presenting data which will fairly represent the climatic condition of Aiken." To those familiar with the two places, this is, indeed, a most astounding revelation; and, with your kind permission, I hope to prove, that, although socially very dear to each other, they have climatically but little in common. Augusta is built upon a marshy flat on the Savannah River, which at times overflows its banks, and submerges a portion of the city; while Aiken is located in what is known as the sand-hill region, five hundred and sixty-five feet above sea-level, which is higher than any other town or village within a radius of seventy miles. The soil of the latter place is dry and porous; and to obtain water, wells have to be sunk to a depth of from a hundred to a hundred and twenty feet; and there is no water-course within two miles of the town, and even at that distance there are but brooks or small creeks. The result of this absence of soil-moisture, and of large bodies of water, would of itself tend to diminish the amount of humidity in the atmosphere; but this is still further diminished by the absence of any hill or mountain to interrupt the free circulation of the wind. Augusta, on the contrary, is situated, as before stated, on a plain lying between a range of hills and the river. All this would lead one to expect that the climate of Aiken would be extremely dry; and that this is really the case is proved by carefully conducted observations extending over many years, which show that the average relative humidity, fifty-eight per cent, is lower than that of any other station east of the Rocky Mountains, and eleven