specialised and valuable, though restricted, branch of agriculture—there are many other questions of interest to the physiologist. Thus it is a very common practice to castrate male animals in order to increase their docility and their capacity for laying on flesh. Ovariotomy of the females is also practised, though much less commonly, but with the same object. Abortion is another matter to which attention is directed. Enormous amounts of money are involved in these stock-breeding problems, and in addition many of them are of considerable physiological importance.

The *Agricultural Students' Gazette*, the organ of the Royal Agricultural College, Cirencester, contains articles by old students or members of the staff dealing with questions of general agricultural interest. Mr. B. Bathurst writes on tariff reform and the tenant farmer, and Mr. Boulger on the biology of the soil. The scientific work of the college is published in a separate bulletin, which has already been reviewed in these columns.

THE EDUCATIONAL VALUE OF THE SCHOOL GARDEN.[1]

IT is becoming increasingly common for rural elementary schools to start a garden in which the scholars may take a certain number of lessons during the season. The idea of a school garden appeals to the village community; the village critic is nothing if not practical, and he insists, and with a good show of reason, that if book-learning is any good at all it ought to teach a man how to raise onions and potatoes well. So successful has the movement been that it has spread widely, and has reached a stage when the whole question of the relation of gardening to rural education may usefully be considered.

The circular before us contains a highly suggestive discussion of the place of the garden in the school curriculum. The garden, it is pointed out, makes two very powerful appeals to those who wish education in our public elementary schools to be more practical; it leads to the formation of habits of thoroughness, and it is eminently useful. But it may also be dealt with on a much higher plane. The purpose of the garden should be to educate boys and girls, and not merely to show them the usual ways of cultivating the common vegetables and flowers, or to practise them in the manual operations of gardening. The scholar must be led to understand the reasons of the common processes in their relation to the soil and climate, the causes and conditions of health or disease in plants, and something of the principles on which the selection and improvement of seeds and plants depend. It is, indeed, a branch of nature-study rather than a training for a profession, and it has two great advantages over many other branches: it produces visible and tangible results—thereby appealing forcibly to the utilitarian instincts of the child—and it does not, or should not, degenerate into the series of disconnected object-lessons of little educational value that sometimes passes under the name of nature-study.

Gardening has another great advantage over other subjects in that it is essentially experimental. Set experiments cannot easily be made because the areas are far too small for inequalities of the ground to be smoothed out; indeed, they may be wholly misleading. But throughout the scholar is trying and trying again, observing his results, attempting to account for his failures and to devise better methods for the future. The teacher has to strike the happy mean between doing too much for the scholars, thus relieving them of the responsibility of thinking, and of doing too little, and leaving them overwhelmed with a sense of failure.

Of course, the garden is not necessarily a success. If the teacher has no taste for gardening or nature-study he had much better let them alone; he will save himself a good deal of discredit and the children a good deal of trouble. There is no particular virtue in a wide curriculum. If the subjects are treated in a dry and illiberal fashion, no appeal is made to the child's natural interests and his imagination is left untouched, in spite of the range of the syllabus. On the other hand, a restricted choice of subjects liberally treated may have great educational value. It all turns on the teacher himself; his choice of material must be largely determined by what interests him most.

In order to get the fullest value out of the gardening lesson, it should be correlated as much as possible with the other school work—with drawing, arithmetic, composition, nature-study, and so on. A number of hints are given showing how this may be done.

The publication is very interesting, and shows a lively appreciation by the Board of the possibilities of the case. A teacher who works in accordance with the spirit of these suggestions will do some distinctly useful work.

[1] Suggestions for the Consideration of Teachers and others concerned in the Work of Public Elementary Schools. (Circular 746 of the Board of Education.)

THE TELEGRAPHY OF PHOTOGRAPHS, WIRELESS AND BY WIRE.[1]

IT frequently happens that when two alternate processes are available for certain work, and one of them is considerably less practical than the other, the less practical one is possessed of much higher scientific interest. This may certainly be said of the telegraphy of pictures and photographs. The whole of the methods of transmission can be classed as either purely mechanical or dependent on the physical properties of some substance which, like selenium, is sensitive to light.

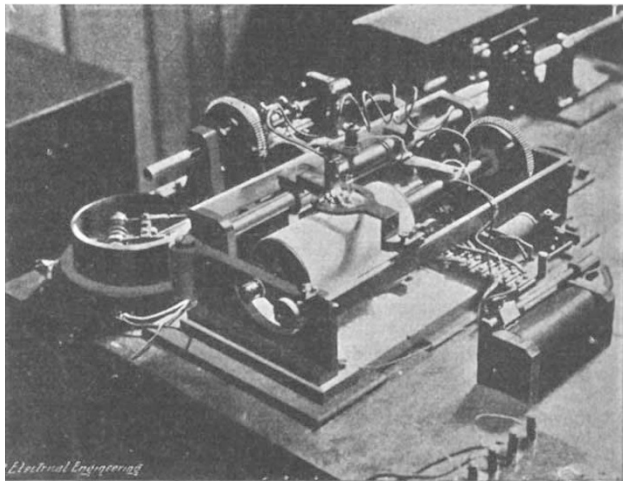

FIG. 1.—Photograph showing a Portion of the Photo-telegraphic Apparatus.

The latter methods are of no little scientific interest, and, although very delicate and for the moment obsolete, there is every likelihood of their coming into more extended use later on.

The telegraphy of pictures differs only from the transmission of ordinary messages in that the telegraphed signals, recorded by a marker on paper, must essentially occupy a fixed position. In the case of an ordinary telegram, it matters little whether the received message occupy two, three, or more lines when written out on paper, but when a picture is telegraphed every component part of it must be recorded in a definite position on the paper.

Suppose you greatly enlarge a portrait, and divide it up by ruled lines into a thousand square parts. Suppose, also, that the photograph is printed on celluloid, so that it is transparent. If, now, the portrait be held in front of some even source of illumination, it will be seen that each square—each thousandth part—is of different density. The light parts of the photograph will consist of squares of little density, the dark parts of squares of greater density, and so on. In this way the photograph is analysed into composite sections, each section corresponding precisely to a letter in a message; letters and spaces recombined form

[1] Discourse delivered at the Royal Institution on Friday, April 22, by Mr. T. Thorne Baker.