A CHICKEN-FEEDING MACHINE.

BY W. FRANK M'CLURE.

Fattening fowls for the market by means of machinery, on first thought to most people seems ridiculous, hardly more so, however, than the hatching of chickens by means of an incubator a few years ago. The incubator has come to stay, and the chicken feeder, although an innovation, has found a place in some of the largest poultry yards. Modern genius in recent years has affected the poultry farm just as decidedly as it has the apiary or the stock farm, and its problems have offered a wide field for scientific study.

It is claimed that chickens fattened by machinery comprise sweeter and tenderer meat than those fattened in the ordinary way. Fowls are fed in this manner for two or three weeks prior to killing, and in that time increase in weight from two to three pounds. The chickens are not allowed exercise in this time, and are allowed no other food than that which is received from the machine. The feeding is done twice a day, and one man can feed 300 chickens in a day. It is a patent liquid food that is fed in this manner, the ingredients of which, of course, are known only to the maker.

The feeding machine is nicely illustrated in the accompanying photograph. The food is forced through a tube by means of a suction pump, which in turn is operated by a foot pedal. The tube, which is about ten inches in length, reaches through the chicken's mouth into its crop. In the photograph this tube is shown on the outside of the fowl's neck, reaching to about the same point as when inserted in the mouth. When the crop is full the flow of liquid food stops instantly, and the chicken is not injured in the least. This feeding by machinery is done chiefly in the preparation of roasters for the market and for finishing the fattening of broilers.

Notable progress has also been made among poultry raisers in the increased production of eggs. It is claimed to-day that it is within the power of the poultry owner to make his hens lay an average three years' crop in two years, and that even molting is controlled at the will of the owner. This is an important discovery in this day, when the demand for eggs is so enormous and the price so high. In the last annual report of the Secretary of Agriculture, a statement is made which gives an idea of the size of the annual consumption of eggs in this country. This report states that the hens of the United States lay 1,666,000,000 dozens of eggs a year, the value of which in one month is enough to pay the interest of the entire national debt for one year. There is little question that the scientific study that has been given the subject of poultry raising in recent years has added materially to this annual egg production over what it otherwise would have been. Proper housing, for example, has come to be recognized as an absolute essential. Also, as pure air is required for the healthy human being, so also the well-bred fowl to-day is given plenty of fresh air, while at the same time drafts are avoided.

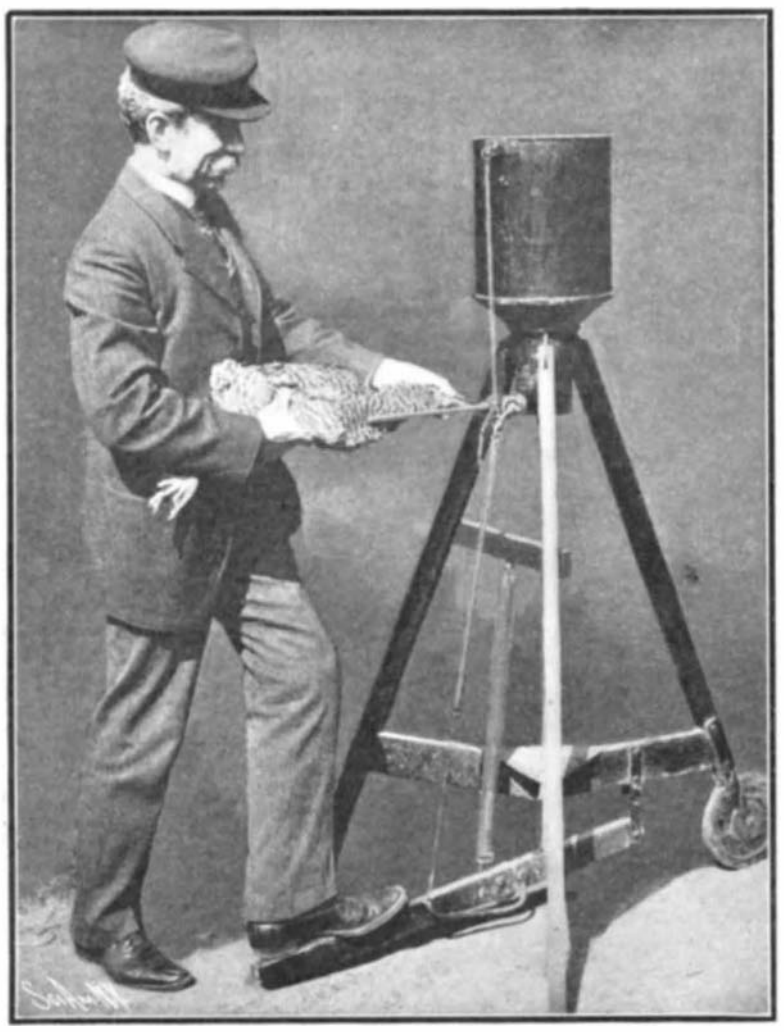
It is not unusual nowadays to see numerous small chicken houses scattered over a large field where the poultry business is carried on upon an extensive scale. This arrangement, of course, admits of the various flocks being housed separately. Artificial heat is seldom resorted to in heating these houses, except in extreme cold weather. With all surroundings conducive, it is not unusual for one hen to lay sixteen dozen eggs in one year, and even better records than this are often made. Few poultrymen, however, attain such records with their flocks unless they have made a study of the numerous scientific methods of caring for them.

A new application of wireless telegraphy has been introduced by two English inventors. The device is purely for entertaining purposes, consisting of the operation of musical boxes placed at different points from one common center. There is a receptacle in which the coin is placed, and immediately a musical box placed at a distance, such as in another room, commences to play.

NEW CŒLOSTAT AND HORIZONTAL TELESCOPE OF THE ASTROPHYSICAL OBSERVATORY OF THE SMITHSONIAN INSTITUTION.

A novel form of cœlostat has been designed by Mr. S. P. Langley, of the Smithsonian Institution, for the study of the absorption of the solar envelope and for measuring the energy of sun-spot spectra. Mr. C. G. Abbot describes this instrument as follows in the Smithsonian Miscellaneous Publications:

The beam is reflected due south from a rotating mirror and thence due north from a second mirror over the top of the first. The beam from the first mirror shoots upward at an angle with the vertical equal to the sum of the angles of latitude and declination; and for the sun at Washington this angle is about 62 deg. at summer solstice and 16 deg. at winter solstice. Therefore to give a horizontal northerly directed beam the second mirror is to be inclined forward 14 deg. at the former period and 37 deg. at the latter.



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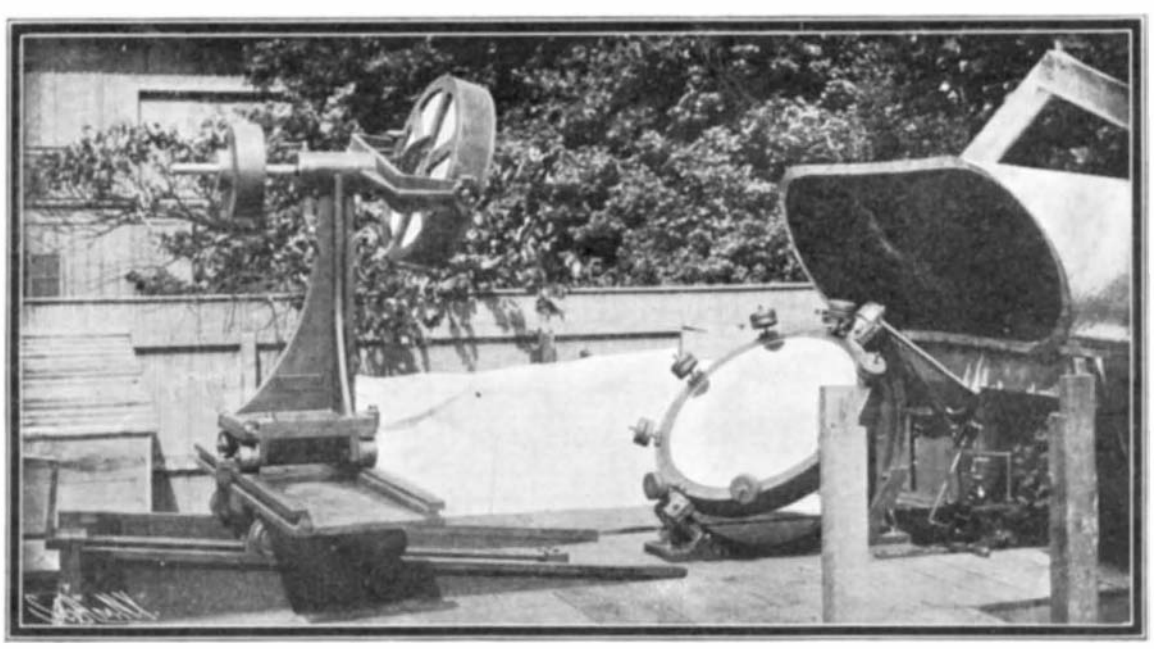
In this form of cœlostat the moving mirror is never used in very different positions, so that owing to the consequent probable constancy of figure in the mirror it seems to be well suited to long exposures in stellar photography.

At noon of the equinoxes the second mirror if exactly south of the first would cut off the beam, and at summer solstice it must be further south than in winter to reflect the beam clear over the first mirror. Accordingly the second mirror is provided with a carriage and two pairs of tracks at right angles like the slide rest of a lathe, so that the mirror may be displaced to the west a little before noon when the sun is in its southern declinations, and can be shifted back to the east a little after noon. The north and south track is for the purpose of shifting the second mirror for different declinations of the sun, the mirror being at the south end of the track at the summer solstice.

As it has been thought that this solution of the difficulties attending the use of the cœlostat will prove of interest and value to astronomers, a large instrument of this type was ordered from the J. A. Brashear Company and sent for exhibition to the recently-closed Louisiana Purchase Exposition. The accompanying engraving is reproduced from a photograph of this cœlostat as now being tested at the Astrophysical Observatory, in connection with the long-focus mirror above mentioned. There is also shown in the illustration a portion of the "churned" tube of the horizontal telescope, of which more will be said later. The cœlostat carries a thirty-inch and a twenty-five-inch mirror, the former turned by a polar axis driven at the rate of one complete rotation in forty-eight hours, the latter mounted on a carriage with traverse motions at right angles like the slide rest of a lathe. The cell of the second mirror is carried by trunnions in a fork, itself capable of turning about a horizontal north and south axis, and by these two motions of rotation, with their fine adjustments, the beam may be sent in any direction whatever, though most favorably in a nearly northerly one. In actual use the reflected beam is depressed about 6 deg. from the horizontal to feed the long-focus mirror, which is 55 feet north and about 3½ feet below the center of the first mirror of the cœlostat, directly under which the beam passes toward a focus on the third pier, some 85 feet further south. To provide for this depression of the beam from the horizontal, the north and south, or declination, track of the cœlostat is inclined upward at a corresponding angle, so that the reflected beam may always clear the first mirror. The length of travel of the lower base of the second mirror on this north and south track is five feet and the lower base itself has an east and west track six feet long on which the upper casting is moved to and fro to allow for avoiding the shading of the main cœlostat mirror by the cell of the twenty-five-inch mirror between 11 o'clock and 1 o'clock near the times of the equinoxes.

Early experiments on an artificial star with the long-focus mirror, before the completion of the cœlostat or the installation of a tube, showed conclusively that the "boiling" caused by irregularities of the atmosphere over the grass-grown soil between the mirror and its focus was far too great to permit anything like satisfactory definition on the solar image, and therefore the novel device of a tube with provision for stirring the air by means of a blast was ordered. It consists of a main horizontal tube 24 inches in internal diameter with diaphragms at five-foot intervals, and with an inclined flared tube uniting with the main tube at the north end close in front of the concave mirror. At intervals of about five feet, five-inch ducts lead to air-mains 14 inches in diameter, which in turn at length unite in two twenty-inch mains leading to the intake and blast respectively of a twenty-nine-inch fan blower with direct-connected 2½-horsepower electric motor. It is so arranged that the openings in the telescope tube communicate with the blast and suction of the blower alternately, so that the air within the tube is repeatedly carried through the system and churned over and over. Thus the path of the beam from the cœlostat to the focus of the mirror is thoroughly stirred, but nothing has been done as yet to introduce stirring between the cœlostat and the sun. It is possible that an attempt will be made later to stir the path of the beam in the eighty feet immediately above the cœlostat, if it is found impossible to get good enough definition with the present arrangements.



THE TWO-MIRROR CŒLOSTAT OF THE SMITHSONIAN ASTROPHYSICAL OBSERVATORY.

It should be recalled that the conditions required for bolometric work are quite different from those suited to direct eye vision or to photography. Bolometric studies require unchanging transparency of the air, else difference in the galvanometer deflection may be due to alterations in transparency of