

UNITED STATES PATENT OFFICE

2,164,316

DISINFECTING PROCESS

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No Drawing. Application February 14, 1935,
Serial No. 6,483

6 Claims. (Cl. 21-58)

This invention relates to an improved method of disinfecting incubators or hatchers.

More particularly, it is concerned with a method for disinfecting incubating devices for hen eggs, whereby the spread of white diarrhea among chickens may be controlled or prevented. This disease is caused by the organism *Salmonella pullorum* which, it is generally understood, is transmitted from the mother hen to the egg. The general purpose of the invention is to prevent the chicks which as embryos have suffered contamination from communicating the infection to healthy chicks which are hatched simultaneously with the infected birds. It is generally believed that in the incubator or hatcher the infection is most frequently transmitted to the uninfected chicks by breathing of contaminated debris (such as chicken down, droppings, etc.) which is blown about the incubator by the forced air circulating system generally forming part of the device and it is, therefore, essential to continuously sterilize the incubator contents during the hatching period.

The method at present employed for this purpose consists in placing within the hatcher or incubator a mixture of a 30 to 40% formaldehyde solution (prepared in accordance with U. S. P. standards) and potassium permanganate. This mixture releases formaldehyde gas which exercises bactericidal action upon the incubator or hatcher contents. This method possesses the following serious disadvantages, however, which render it unsatisfactory:

1. The formaldehyde is toxic to the chicks, if absorbed by them in relatively large quantities and, therefore, careful admeasurement and control of the amounts placed in the hatcher are necessary in order to avoid an overcharge. Such precise admeasurement is difficult, since the commercial formaldehyde solution practically available at the hatchery will vary in strength; the amount of gas liberated through the action of the potassium permanganate is not evolved at a constant rate throughout the entire reaction period during any one treatment or successive treatments. Thus, even when identical ingredients and quantities are successively used, the amount of gas evolved will often vary as much as 50% more or less.

2. Because of its toxicity, the formaldehyde gas must be forcibly expelled from the chambers of the hatchery after a short period, generally after approximately 10 minutes, and it is then necessary to permit some time to elapse before re-charging the chambers with the formalde-

hyde. In fact, the treatment is generally not repeated more than two or three times during an entire hatching period. Thus, it will be seen that by this method, the chambers are not in sterile condition during the greater part of the hatching period.

It is, therefore, the prime object of the present invention to carry out a continuously effective disinfection process of the type described, without the necessity of renewing the bactericides, and without harmful effect on the chicks.

I have found that this object may be accomplished by maintaining the atmosphere of the hatchery chambers completely saturated with a disinfecting agent which may be used in a quantity sufficiently large to exert a constant bactericidal action throughout the hatching of an entire brood, without untoward effect on the chicks.

According to my invention, I place within the hatcher or incubator a quantity of a bactericidal material which, by its inherent vapor pressure, will readily volatilize within the temperature range of 96° F. to 104° F., the range usually maintained in incubating devices of the type described, in sufficient quantity to destroy the germs efficiently and yet, at the same time, remain innocuous to the healthy birds. The vapors thus volatilized in sufficient concentration will disinfect the hatcher, generally, and particularly the down of the newly hatched infected birds, so that even if the down is blown about the chambers, after drying, the other birds will not contract the disease from it.

I have now found that chlorthymol, for instance, satisfactorily meets the requirements of my purpose, since it rapidly volatilizes and, at the temperatures required for incubators and hatchers, its maximum vapor concentration will be non-toxic.

In practicing my invention I expose to the air circulating in the hatchery chamber a quantity of a disinfectant of the type described, in dry crystalline form. The disinfectant volatilizes from the crystals until a state of equilibrium is established between its vapor pressure and the concentration of the vapor of the circulating air.

Also, in order to secure the largest surface exposure possible, and thereby shorten the time required for the saturation point to be reached, it is desirable to present the crystals to the air of the chambers in the most finely powdered form possible.

The amount of disinfectant used should be in excess of that actually required, and should be governed by the size of the apparatus to be used.

For example, in disinfecting a forced draft hatcher of approximately 100 cu. feet in size, the procedure and admeasurements are as follows:

A rack comprising six cloth-spanned frames about 20"x20" is placed in the compartment containing the air-circulating and humidifying system, the rack being positioned as closely as possible to the air circulating fan. About one pound of finely powdered chlorthymol is then spread out widely over the cloth spanning the frames. By the action of the air circulating throughout the hatcher, the disinfectant material will volatilize more or less rapidly, according to the degree of surface exposure attained, and thoroughly disinfect the hatcher contents. The time required for exposure is about three days, 36 to 48 hours of which may be considered as actual hatching time.

It is to be understood, of course, that in the preceding illustration the amount of chlorthymol placed in the hatcher is greatly in excess of that which will be volatilized during the disinfection, but the excess quantity will serve to hasten the volatilization and more certainly maintain the required saturation of the air throughout the hatching chambers. As a matter of fact, the amount of chlorthymol actually consumed under the conditions described is only about one ounce.

Although I have specifically mentioned chlorthymol as being eminently suitable for use in my method, other materials of similar character may be used, it being understood that in order to be effective, such material must be capable of volatilization under the conditions of the required temperature and humidity and capable of being used in such quantity as is required for constant disinfecting action; and it must, of course, also be non-toxic to the new-born birds at incubator and hatcher temperature.

I claim as my invention:

1. A method of continuously and uniformly disinfecting the contents of hatchery chambers which comprises exposing to the air circulating in said chambers an amount of crystalline chlorthymol in excess of the amount actually required for disinfecting purposes, said disinfectant being readily volatile under the temperature and humidity conditions maintained in incubators and hatcher, and maintaining a substantially

constant amount of said chlorthymol in the vapor phase within said chambers.

2. The method of disinfecting hatchers and incubators which consists of placing within the chambers thereof and under the influence of the circulating and humidifying system a receptacle containing an excess of finely ground crystalline chlorthymol to give the maximum surface exposure for the rapid and continued volatilization of the said chlorthymol to saturate the air in the system under the conditions of temperature and humidity of such devices, and continuing the treatment throughout the hatching period of an entire brood.

3. A method for protecting newly incubator-born chicks against the attack of the organism *Salmonella pullorum* which comprises disinfecting the contents of incubating devices by continuously maintaining the air of such devices impregnated with vaporous chlorthymol by exposing to the air an amount of chlorthymol in excess of that required for impregnation under the temperature and humidity conditions maintained in incubators and hatcher.

4. A method of protecting newly incubator-born fowl against attack by disease germs, especially of the order of *Salmonella pullorum*, which comprises impregnating the hatcher atmosphere with chlorthymol in its vapor phase at a substantially constant equilibrium.

5. A method for protecting newly incubator-born chicks against the disease white diarrhea which comprises disinfecting the contents of incubating devices by continuously maintaining the air therein impregnated with vaporous chlorthymol, by exposing to the air an amount of chlorthymol approximately equivalent to one ounce per 100 cubic feet of air space.

6. A method for protecting newly incubator-born chicks against the disease white diarrhea which comprises disinfecting the contents of incubating devices by continuously maintaining the air therein impregnated with vaporous chlorthymol, by exposing to the air an amount of finely divided crystalline chlorthymol in excess of one ounce per 100 cubic feet of air space within the apparatus.

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