Correspondence.

A Remarkable Dog.

To the Editor of the SCIENTIFIC AMERICAN:

A peculiar incident occurred to my fox terrier Fritz, which may be of interest to the readers of your valuable paper. On last Tuesday, while the cellar door was open, the dog descended in search of rats, at about 9 o'clock. At 9:30 the dog was searched for and thought lost. No further notice was taken in the matter until Wednesday morning at 11 o'clock, when I was attracted by a dog yelping. After a careful search in the cellar, which revealed only a pile of sand by the wall, I noticed the dog's nose protruding through an inch board at the top window of the cellar looking into the yard. I went immediately upstairs and removed five bricks from the pavement and pulled the dog out. After a careful inspection I discovered he had dug under the foundation of the house in the sand, which had caved in on him. Finding no other means of escape, he dug up to the surface, a distance of six feet; and on arriving at the brick surface, which had been recently paved, dug toward the window a distance of three feet, and had nearly eaten through the board in his efforts to free himself. He was nearly exhausted when discovered, being 26 hours under ground. One eye was entirely closed from sand, the other nearly so. The same dog recently jumped from the second story window, a distance of 18 feet, only injuring his toe nail.

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Cold Storage.

Experimental attempts at cold storage began in this city eighteen years ago, and developed into a commercial industry three years later. Since then the knowledge of scientists and inventors has been combined with the practical experience and capital of warehousemen, until now the business of cold storage and freezing is a considerale factor in the market supply of the world. At first the cold air from refrigerators on the ground floor was forced to storerooms above, but this plan was soon given up for the system, still in limited use, of massing ice at the top of buildings, so that a current of cold air is drawn by gravity through shafts to the lower floors. By this system only cold storage at 38° and above is possible, while actual freezing is necessary for many classes of goods. One of the nine large cold storage warehouses in this city uses a system of metal pipes ten inches in diameter, which encircle storage rooms. These begin below the "charging floor," the upper story of the building. Here ice is broken by hand power, the sectional trap doors are lifted, and the pipes, set close beside each other and extending down to the floors below, are closely packed with ice and salt. The drainage from these, which is collected on the second floor, is utilized to cool rooms on the ground floor to a temperature of 40° degrees. This method of cold storage is especially adapted for holding comparatively small amounts of perishable goods, without the cost of expensive machinery.

The system most generally in use, however, is that of producing intense cold by the evaporation of ammonia, and one of the largest and best equipped cold warehouses uses the so-called "direct expansion" system, which it is not necessary here to explain. In this immense establishment, which comprises in two warehouses 1,500,000 cubic feet of cold storage and freezing space, eight boilers, each of seventy-five horse power, are used in the smaller building alone. The engines, compressors, and all parts of the machinery are in duplicate, so that if one set is disabled the other set of machinery may be started and the requisite temperature throughout the building steadily maintained. Whatever the method used, the effect aimed at is the reverse of steam heating, that is to grasp and carry heat out of the rooms which it is desired to refrigerate. The brine which is produced by the ammoniacal gas process, and conveyed throughout the buildings in main pipes and smaller coils, leaves the manufacturing room in the basement at zero and returns from the circuit only 5° higher. All this apparatus in specially constructed buildings costs money, and at the present time more than $4,000,000 are invested in cold storage in this city alone.

The first floor of these great buildings is usually occupied by offices and open space necessary for receiving and discharging goods, and the storage floors above are reached by heavy freight elevators. Passing through a small anteroom on leaving the elevator, the "bulkhead," or thick wall, which is air spaced and padded so as to be as nearly as possible a non-conductor of heat, is reached. The heavy door swings open, and a change of 50° to 70° is realized in a second of time. The purity of the atmosphere and the uniform temperature of each room or "box" are evident. Tiers of goods extend to the ceiling, closely packed along immense floor spaces, or in smaller lots in separated rooms. To the visitor, who, as well as the guide, is protected with heavy wraps, the long stretches of pipes and rafters covered with frost crystals glittering in the electric light present a strange and beautiful spectacle. Poultry, meats, fish, butter, and eggs are stored in largest quantity, and actual experiments show that these usually perishable goods can be held in cold storage almost indefinitely, and meat and fish frozen and kept for five years have come out in good, marketable condition.

By this preservative process a glut is prevented in periods of too plentiful supply, the season for perishable goods is lengthened to extend the year through, and prices are equalized, to the profit of both producer and consumer. For example, yearling turkeys, which last February were stored and frozen, and since kept in a dry air at ten to fifteen degrees, are now the choice delicacy offered in the best hotels, and bring in the markets three-cents a pound more than the best spring turkeys. But even in this favoring market there is not much profit to the merchant, since a third of a cent per pound is charged for the cold storage of poultry a month, and the higher rate of half a cent a pound each month for freezing. The prices charged for storage are, however, nearly fifty per cent lower than they were ten, or even five, years ago.

The vegetable and fruit supply of this district has been strikingly influenced by cold storage. Peas, lima beans, lettuce, okra, celery, and other seasonable vegetables are at this time stored by wholesale merchants for a few days or a week to hold steady a variable supply. Large quantities of domestic pears are also being carried on short-term storage. Considering the oversupply of California fruit now reaching this city, it is at first a surprise that none of it is being held for higher prices, but this is because the summer varieties, which alone are now coming, cannot be safely held, even in the cold dry air of these warehouses. Tokay and other grapes of vinifera blood later in the season are successfully held for three weeks, and Cornichons have been kept for six weeks and even two months. The more delicate varieties of grapes from this State and Ohio remain in good condition for several months, until the supply is exhausted by Thanksgiving season. The tough-skinned Catawbas, however, are brought out of an atmsphere of about 35° as late as April, when even the Almeria season is past. Domestic pears come from the refrigerating houses until midwinter, and some California pears, notably P. Barry, are keep successfully and profitably as late as June. Instances of large profit in carrying these pears are often cited. For example, lots stored in September, when they sold for $1.98 a box, commanded $8 a box nine months later.

Late spring varieties of Florida oranges often yield the largest profits of this crop, and are known to have quadrupled in value by July. In fact, oranges can be kept almost indefinitely, although they are rarely held more than sixty days without deteriorating somewhat in quality.

Horseradish, stored last spring when it cost three to four cents a pound, is now selling as high as ten cents, and buckwheat flour, after having been carefully cooled and kept against all objectionable intruders during the summer months, will soon be selling to eager buyers as the first new buckwheat of this year. Dried fruits and nuts are similarly protected during the warm weather, and seed corn and peas are kept in a freezing temperature to prevent sprouting and to destroy weevils. Owing to an abundance of cabbage last year, quantites of sauerkraut were stored, and this has proved a lucky venture on account of the failure of this season's cabbage crop.

These artificial low temperatures, besides their uses in arresting the decay and retarding the maturity of fruits and vegetables, are applied to other purposes connected with horticulture. Nursery stock has been kept in a cool temperature in good condition for three years, with the roots plump and ready for growing when taken out. Hardy plants which are intended for forcing are often frozen after they are lifted, so as to give them their needed experience of a winter, after which they will push forward with healthy energy. Imported pips of lily of the valley are largely held in cold storage, not only to preserve them, but because they start more quickly and strongly after having been frozen. Bermuda lily bulbs and other stock of this sort are also treated successfully in this way.

Refrigerator cars have made it possible to transport California fruit to New York, and some of the freezing processes on shipboard have been so perfected that perishable fruit can soon be sent all over the world. Unsound fruit cannot be saved by cold storage, but it can be kept in good condition if it is sound and not too ripe when first placed there. Cold warehouses in fruit districts have been advocated for storing the products of a neighborhood, so that they can be held for shipping until a time when the demand would make it profitable. To a certain extent this is practicable; but, as a rule, it is not safe to ship fruits after they have been a long time chilled, and, in a majority of cases, it seems preferable to transport the fruit directly from the orchard or the vineyard to its destined market, and then, after carefully selecting and packing that which is not overripe, to hold it until the time of demand. Many of the grape growers of this State will ship directly from their vineyards a part of their crop this year to be refrigerated in this city. It is claimed that the fruit keeps better when treated in this way than when it is stored in cold houses at home and shipped to this city afterward.—M. B. C., Garden and Forest.

Notes on the Handling of Petroleum.

A paper read before the Institution of Civil Engineers in London deals with the transportation of crude petroleum in bulk, from the point of view of minimizing the risks of fire and explosion, by Mr. Boverton Redwood. The subject was discussed in reference to transportation by tank steamships, but much of what was said applies with equal force to the transportation of this highly inflammable substance by tank cars. Experience has taught that the danger of explosion while handling petroleum lies not so much in directly igniting the oil as in igniting the inflammable and explosive mixtures of petroleum vapor and air.

The author of the paper alluded to stated that certain descriptions of petroleum evaporate freely at common temperatures: that the vapor given off is much heavier than air, and remains for a considerable length of time in any receptacle capable of holding a liquid, or may flow unperceived for some distance in a stream similar to that of a liquid; that the vapor is highly inflammable, and capable of carrying back flame to the source whence it emanates; and that mixtures of petroleum vapor and air may be either inflammable (burning silently) or more or less violently explosive. It was further shown that petroleum, at temperatures below that at which vapor is freely evolved, may be converted into a highly combustible spray. Crude petroleum consists of a great number of hydrocarbons, some of which are exceedingly volatile, and the vapor given off may be from 2½ to 3½ times heavier than air, its density depending upon the chemical composition of the hydrocarbons present. From the vapor density the volume of vapor given may be calculated, and it was thus found that one volume of a petroleum spirit consisting principally of hexane yielded 187 volumes of vapor at 60° Fah. The percentage volume of the vapor of a volatile hydrocarbon taken up by air depends upon the tension of the vapor, and varies with the temperature. When the vapor of petroleum is brought inte contact with air, diffusion takes place, the heavy vapor traveling upward into the lighter air, and the air passing downward into the vapor.

Referring to the conditions under which an explosive mixture of petoleum vapor and air may be ignited, it was stated that neither the glowing end of an ordinary wooden match or of a "fixed star" vesuvian, the flame of which has been extinguished, nor a redhot coal which has ceased to blaze, nor a shower of sparks from a flint and steel, or from the fireworks known as "scintellettes" and "golden rain," is capable of causing the combustion of the mixture; but a platinum wire raised to white heat by means of electricity invariably causes ignition, though at a red heat no such effect is produced. Either the electric spark, or a flame, at once causes the explosion of such a mixture, but an inflammable mixture containing a small proportion of vapor may be ignited by a large flame, when a small flame or an electric spark proves ineffective for the purpose. The use in an oil tank of a heated rivet at a temperature below that which is requisite for the ignition of a mixture of petroleum vapor and air may nevertheless be attended with danger, owing to the ignition of the oil which remains between the plates at the laps.

So long as the cargo tanks are full of oil there is very little risk of fire or explosion, except through serious structural damage resulting from collision or other accident. The accumulation of vapor due to leakage of oil from the tank domes of the oil tanks must, however, be guarded against, and care must be taken that these do not become overfilled or empty in consequence of increase or diminution in the volume of the oil.

Smoking and the use of matches about tanks filled with petroleum should be prohibited. The chief risk occurs during loading and discharging, and the precaution just named should then be zealously enforced. The tank covers should be kept closed as much as possible, and in the case of crude petroleum provision must be made for the safe discharge of vapor during loading. Before the tanks are entered for inspection they should be ventilated, and if repairs necessitating the use of hot rivets are to be effected, the oil compartments and adjacent spaces should be thoroughly cleansed and efficiently ventilated by a steam jet or fan blower, until on testing by a competent expert the complete removal of inflammable vapor is found to be accomplished.

Proportion of Solids in Milk.

According to A. Schmid, chemist to the Swiss Canton Thurgau (Chem. Zeit.), in 76 per cent of the samples of milk examined the total solids exceeded 12·5 per cent; in 20 it ranged from 12·5 to 12; and in 4 only did it fall below 12 per cent. Hence it appears that the demand of 12 per cent solids (and 3 per cent fat) as a minimum is not exorbitant. According to the same journal, 12 per cent solids, including 3 per cent fat, is the minimum permissible in Basle city.