SCIENCE

[Entered at the Post-Office of New York, N.Y., as Second-Class Matter.]

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

SEVENTH YEAR.
VOL. XIII. No. 329.

NEW YORK, MAY 24, 1889.

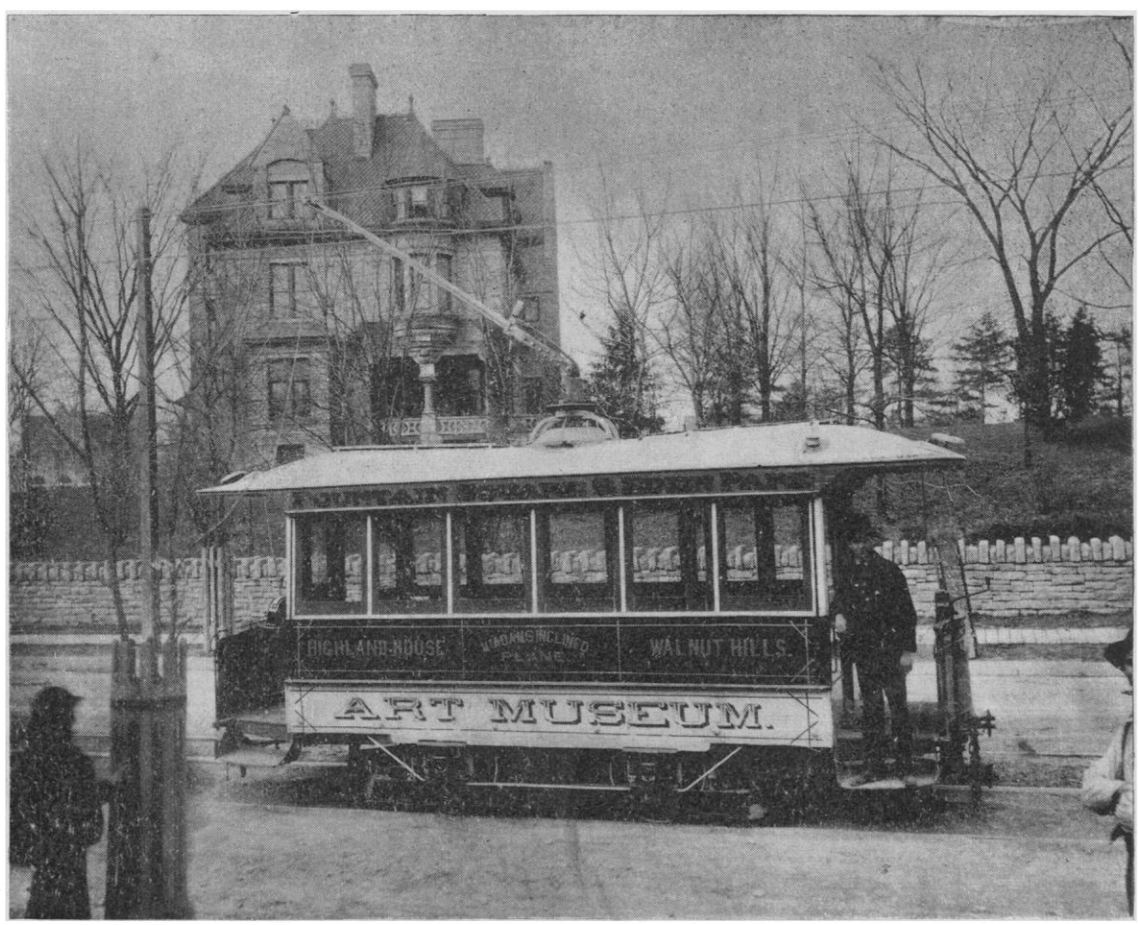
SINGLE COPIES, TEN CENTS.
$3.50 PER YEAR, IN ADVANCE.

THE DAFT ELECTRIC ROAD IN CINCINNATI.

IN response to the request for data as to the electric road known as the "Kerper Walnut Hills Electric Road," now being operated by the Daft system of double-trolley underneath contact, it may be said that it is not generally known that this is the only system of double-trolley underneath contact in successful commercial operation in the United States to-day. It is not intended to imply that there had not been attempts made in this direction; but it has generally been claimed, that, with parallel wires, a double underneath contact was impracticable. Not that such operation was not desirable, because the obtainment of absolute freedom from interruption to telegraphic, telephonic, and fire-alarm service that such a system gave, could not well be any thing else but desirable.

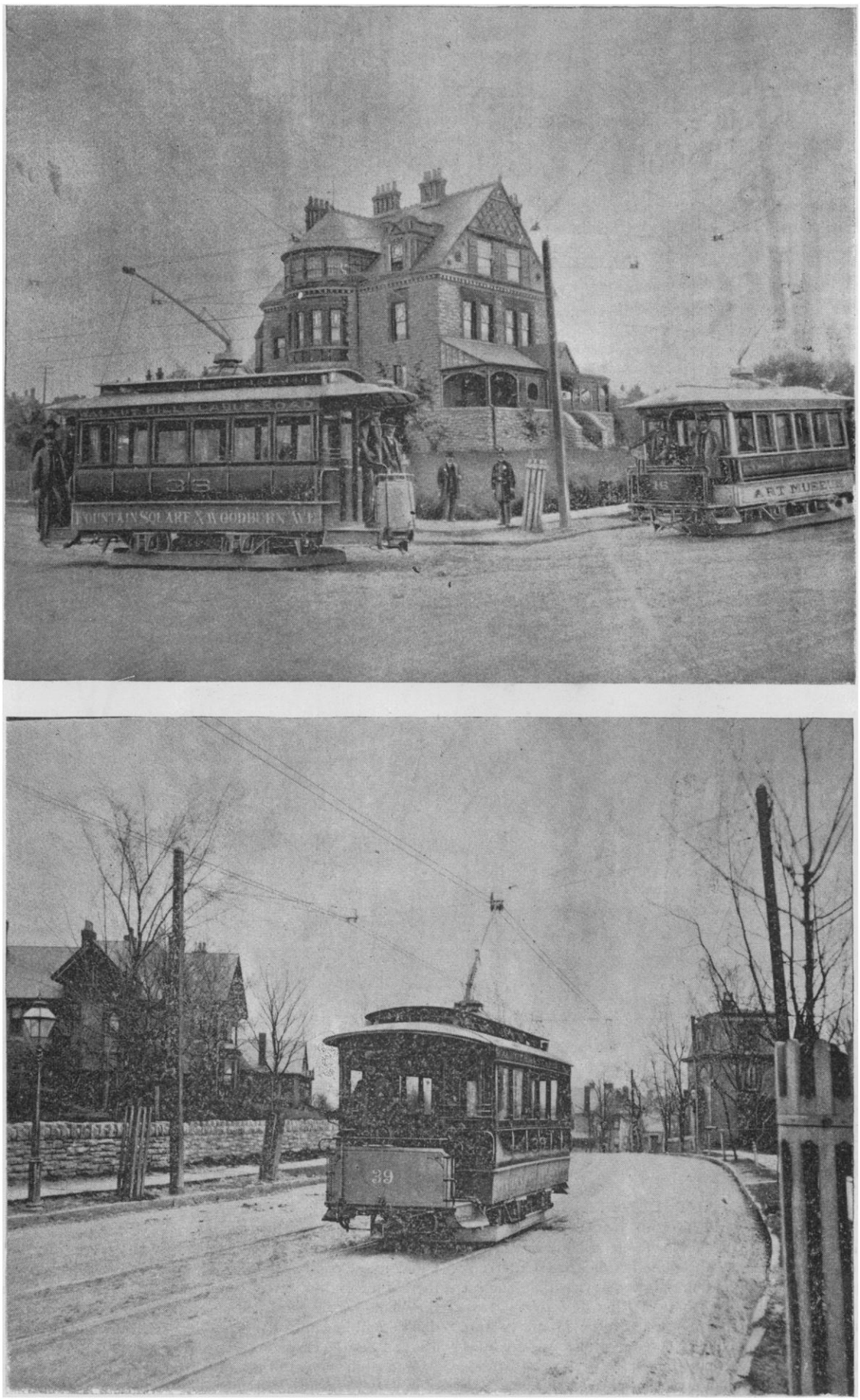
To Mr. George B. Kerper, the president of the Mount Adams and Eden Park Inclined and Gilbert Avenue Railways, credit is due for the introduction of electricity for the operation of street-railways in Cincinnati. More than a year ago he foresaw that this new force was moving rapidly to the front in its adaptability to street-car propulsion. Casting about, he selected the Daft system as presenting features which would recommend itself to the general public. Some difficulty was met with in the operation of this road at first, owing to the peculiar demands made upon it at the McMillan Street and Gilbert Avenue junction. Here concentres an enormous traffic from the Walnut Hills district and the outlying suburbs; in fact, the narrow artery at the head of Gilbert Avenue was practically the only outlet for the vast traffic into and out of Cincinnati.

To Mr. George B. Kerper great credit is due for the solving of what was a most vexatious problem. By him a further extension of the road into Mount Adams and Eden Park Cut was determined upon, a new contract was made, and in thirty days from the date thereof the Daft Electric Company had completely reconstructed the whole line, refurnished its entire equipment, substituting the double underneath for the double overhead contact, and, without a break, set the car in commercial operation.



DAFT ELECTRIC ROAD, WALNUT HILLS, CINCINNATI.

As a confirmation of the judgment of Mr. Kerper as to the value of the Daft system, the remarkable manner in which this double underneath contact trolley furnished by the Daft Company fulfils its purpose, the symmetrical and enduring character of its struc-



DAFT ELECTRIC ROAD, CINCINNATI, ROUNDING CURVES.

ture, the high speed of the cars (going much faster than the cables), the easy motion of the car, the freedom from jerking and lack of danger elements, fully attest the wisdom displayed.

The cars as now equipped are able to tow additional cars, their equipment being of sufficient power. They have fully demonstrated their efficiency in many instances; in one case having pushed the Avondale cars up the 7½-per-cent May Street grade when the horses were stalled from overloading, and in another pushing the heavy cable-trains back upon the track at a recent occurrence.

The performance of regular commercial service by these Daft motor cars over a road upon which there are not over six hundred feet of straightaway track (in one mile there being six cross-overs, eight curves, and grades as high as 7½ per cent, travelling for a portion of the road over a regular cable-line), and the ease with which they are able to run away from the cable-cars, mounting grades continuously wet by street-sprinkling carts, demonstrate that the Daft system in Cincinnati has scored a complete success, and justifies the confidence reposed in it by the managers of the street-railway company.

Praises for the manner of its construction, its equipment, and its operation, are heard everywhere. One of the most remarkable features about this line is the double underneath contact trolley. It requires no attention from driver or conductor: in fact, were it not for the ordinances requiring a conductor to each car, his services would be wholly unnecessary. The trolley moves with the same ease as the car upon the track, and its liability to leave the wires is very much less. Its construction is such that it regulates itself to all the various dips, angles, curves, etc., with the greatest facility.

Another important feature of the Daft system is its great economy.

The power is taken from the engine which drives the Gilbert Avenue cable, and so some fluctuation of speed in the generator results, but not sufficient to interfere in any way with the successful operation of the electric road.

Half-hourly records are kept of voltmeter and ammeter readings, the dynamo speed, and the temperature of the engine-room. From these it can readily be seen when the car is ascending grades, when descending, when at grade, when with more than an ordinary load, etc. At the dynamo station it is practicable to tell at any hour of the day the relative position of the cars to the line. Power is only absorbed by the motors upon the car to meet the requirements made upon it by their several loads. Of course, under such circumstances, when there is no demand for power, there can be no expenditure, and the result is the highest economy. It is usual with street-railway people to base the success of any system, whether it be by horses, by cable, or by electricity, upon the dollar-and-cents basis. In this respect the Daft system recommends itself to thoughtful business-men.

INSECTICIDES AND THEIR APPLICATION.

As the season of the annual warfare between vegetable life and its insect enemies has come round once more, our readers will probably find interesting a report on insecticides recently published by the Ohio Agricultural Experiment Station. The director of the station states that insecticides, or the substances used for destroying insects, may broadly be divided into two classes: (1) internal poisons, or those which take effect by being eaten along with the ordinary food of the insect; and (2) external irritants, or those which act from the outside, closing the breathing-pores, or causing death by irritation of the skin. Besides these, however, various other substances are used in preventing insect-attack, keeping the pests away because of offensive odors, or acting simply as mechanical barriers.

The most important insecticides are the poisons. Of these the most popular are the various combinations of arsenic, known as "Paris green," "London purple," "slug-shot," and a large number of patent insecticides sold under various names.

Paris green is a chemical combination of arsenic and copper, called arseniate of copper. It contains about fifty-five or sixty per cent of arsenic, and retails at about thirty cents per pound. It is practically insoluble in water, and may be applied either dry or wet. In the former case it should be well mixed with some fine powder as a diluent: plaster, air-slacked lime, flour, road-dust, and finely sifted wood-ashes, all answer the purpose fairly well, though lime or plaster is usually preferable. The proportion of poison to diluent varies greatly with different users: one part poison, to fifty, and even one hundred, of diluent, will usually be effective, if the mixing be thoroughly done. In the wet mixture for fruit and shade trees, use one pound poison to 150 gallons water, and keep well stirred. The chief objection to Paris green is that it is so heavy that it settles quickly to the bottom of the vessel, — very much more quickly than London purple. It is also more expensive.

London purple is a by-product in the manufacture of aniline dyes, produced by Hemingway's London Purple Company of London, England. It contains nearly the same percentage of arsenic as Paris green, and is much cheaper, retailing at about fifteen cents per pound. It is a finer powder than the green, and consequently remains in suspension much longer. It may be used in the same way, — as a powder or in water, — and the proportions given above answer very well for it.

White arsenic is sometimes recommended as an insecticide, but fortunately is rarely used. It is much more dangerous to have around than either of the above highly colored compounds, and in practice is very liable to burn the foliage to which it is applied.

The principal substances used for killing insects, by contact, are the following: —

Hellebore is a powder made of the roots of a plant called white hellebore (*Veratrum album*). It is a vegetable poison, but much less dangerous than the mineral arsenical poison, and kills both by contact and by being eaten. It may be applied as a dry powder or in water (an ounce to three gallons). It retails at about twenty-five cents per pound, and is especially excellent for destroying the imported currant-worm.

Pyrethrum is an insecticide of recent introduction, made from the powdered flowers of plants of the genus *Pyrethrum*. There are three principal brands upon the market, known as "Persian insect-powder," "Dalmatian insect-powder," and "buhach," the last being a California product. The greatest obstacle to the use of pyrethrum has been the difficulty of obtaining the pure, fresh article. If exposed to the air, the poisonous principle volatilizes, and the powder is worthless: hence dealers should purchase a fresh supply each season, and should keep it in air-tight vessels. Pyrethrum is used mainly either as a dry powder or in water (one ounce to three gallons), but may also be used in the form of a tea or a decoction, a fume, or an alcoholic extract diluted. For use as a dry powder, it may advantageously be diluted with six or eight parts of flour. It is especially excellent for clearing rooms of flies and mosquitoes, and for killing the common cabbage-worms. It is practically harmless to man and the higher animals.

Kerosene emulsion is made by adding two parts of kerosene to one part of a solution made by dissolving half a pound of hard soap in one gallon of boiling water, and churning the mixture through a force-pump with a rather small nozzle until the whole forms a creamy mass, which will thicken into a jelly-like substance on cooling. The soap solution should be hot when the kerosene is added, but of course must not be near a fire. The emulsion thus made is to be diluted, before using, with nine parts cold water. This substance destroys a large number of insects, such as the chinch-bug, cabbage-worm, and white grub, and is a comparatively cheap and effective insecticide. Besides its use as an emulsion, kerosene alone is frequently used for various pests. It is especially valuable in destroying vermin on domestic animals and in hen-houses.

Carbolic acid, especially in its crude state, is valuable for various insecticidal purposes. An excellent wash for preventing the injuries of several tree-borers is made by mixing one quart soft soap, or about a pound of hard soap, with two gallons water, heating to boiling, and then adding a pint of crude carbolic acid. Carbolic-acid soaps are largely used for destroying vermin on domestic animals.

Tobacco is a very valuable insecticide for use against vermin on domestic animals and green-house pests. It may be used in the form of a decoction, a smoke, or dry. The refuse stems from the