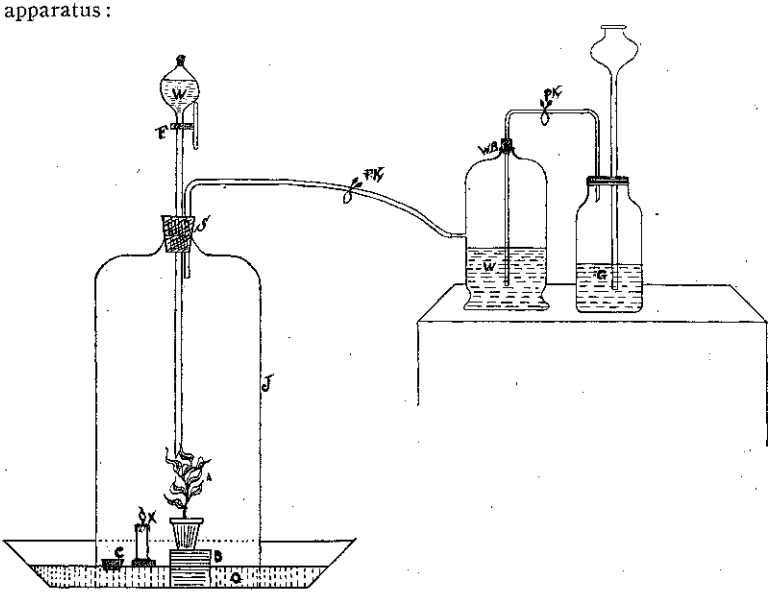
RESPIRATION IN PLANTS.

[The following account came to us from a pupil in a New York City high school. It appears to represent an interesting attempt at original investigation on the part of the pupil. While it is true that respiration in plants has been demonstrated by earlier investigators, and most of its phases are rather well known, the design of the apparatus described below appears to be original. There are certain criticisms of the experiment that might be made, however. Since the writer requests criticism, will not some of our botanical readers attempt a constructive criticism of the experiment? Send such criticism to the botanical editor.—*Editor.*]

The following is a description of an experiment which I performed last winter in my own home laboratory. I set out to demonstrate by experiment that a plant cannot live without oxygen, even if all other conditions are kept normal; in other words, that the process of respiration in plants is identical in principle with that in animals. I had never heard of or seen any similar experiment, either before or since.

So I began to figure it out, and finally I constructed a shelf at the window where the sun came most often, and set upon it the following apparatus:



From the diagram, it will be seen that I aimed to give my plant all the constituents of ordinary air and earth, and all other conditions, i. e., N_2, CO_2, NH_3 (traces), H_2O, sunlight and heat, but NO OXYGEN. That part of the apparatus marked B furnished the CO_2, of which I let in a small number of bubbles each day. The wash bottle prevented any H Cl fumes to get into J.

Each day I gave it a small quantity of H_2O by means of the drop funnel. It will be noticed that more water can be put into the funnel, and that the CO_2 generator can be detached and cleaned without affecting the rest of the experiment.

The sunlight it, of course, received from the window, and the radiator in the room kept the temperature up during the night. The stopper S was sealed with wax. I used oil in the pan because H_2O might contain dis-

solved air or oxygen. The original oxygen in J I eliminated by burning the candle X when I set up the apparatus. Any oxygen that may have remained, or, more important still, any which might have been given off during the progress of carbohydrate manufacture, as a by-product, was consumed by a piece of phosphorus in the crucible C floating on the oil. Thus I watched the experiment for over a week. As a side issue, one of the observations, interesting from a physical point of view, was that in the night, it being somewhat colder, the atmosphere in J contracted and the oil rose in the jar; during the day, the level of the oil was lower in the jar than in the pan.

At the end of three or four days my plant (corn plant), healthy when first put under the jar, showed signs of withering, i. e., turning brown and yellow. This could not have been for lack of water, for I carefully regulated the supply. It kept getting worse, till at the end of eight or nine days it died.

Perfect as I have tried to make the apparatus, I realize that there are several possible flaws in it; and herein lies the possibility that the result is not absolutely conclusive. Some day I hope to repeat it, perhaps with several modifications.

However, I believe it is an interesting experiment, as it is my first attempt at original experimental work in my favorite hobby and future life study, viz, biological chemistry. I give it for what it is worth; and will be greatly obliged for criticism or suggestions from any of the readers of the magazine.

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A TYPICAL GOVERNMENT HIGH SCHOOL.

It is time that our national government set apart a sufficient sum of money for the purpose of establishing an ideal high school in some central locality of the country. In the construction of this school building every provision possible should be made for handling all phases of secondary school work with the highest possible degree of efficiency. In all of its departments the building should be equipped with devices of all descriptions which are most modern in their character, and which are conducive to the most successful teaching.

There are now being erected in all parts of our country secondary school buildings, many of them equipped in a modern manner, many having well-selected libraries and standard apparatus; yet at the same time they have not all the very best arrangement, nor have they the best apparatus, books and charts purcurable for the money expended. This proposed school would be a model in every respect, and a place to which Boards of Education might send committees and societies might send their representatives and instructors themselves might visit, in order to see demonstrated the most advanced equipment in secondary education. It is not intended that this school, when once established, should remain as it is finished, but new devices, new schemes, new apparatus, etc., when invented, should be tried out here. In other words, it should be kept absolutely up to date.

The value of such a school as this cannot be measured in dollars and cents. It would be the means of increasing the efficiency of secondary school teaching more rapidly than by any other plan now in operation. It is hoped that some energetic Congressman who is in touch with secondary school work in the country, will take this matter in hand and push it for all it is worth for the establishment of the best all-around secondary school in the world.