Outside the Gates.

WOMEN.

The International Women's Union, which owes its inception to Mrs. Warner Snoad, moves immediately in the direction of local and political reform. We read in an address, by Miss Emma Marie Stevens, that the aims and objects of the Union are such as to arouse enthusiasm and excite a desire for co-operation in the minds of those who recognise the fact that the woman's movement is not a mere hysterical or temporary expression of energy, but a deep and slowly evolved revolt of nature against unnatural restraints and unnatural impositions. Briefly enumerated, these objects are as follows:—The enfranchisement of women in every country. "The preservation of peace, and the promotion of friendly intercourse between workers of all nationalities," for, as Mrs. Snoad observes, patriotism is a high quality, but the love of humanity is higher, the one sentiment being human and the other divine. The union claims not so much to be a society in itself, as a union of workers belonging to other societies.

It further aims at being a bureau of universal information, supplying members of all nationalities with particulars of any institution or society of which they may desire knowledge; it also affords communication between individuals and societies who are working for women and the promotion of universal peace, in all parts of the world, thus allowing of exchange of ideas, sympathies, and information of work and progress.

Each branch of the Union is at liberty to make its own bye-laws, and act upon its own responsibility. As Mrs. Snoad has herself explained, the great object is to form a solid phalanx of the whole sex, of which each separate movement is but a component part of the whole; each division being free as to detail, but united in purpose. It will thus be observed that the International Women's Union does not attempt to alter the rules or regulations of any existing societies, but rather desires to bring them all into union and co-operation with each other upon the one vital point, leaving them otherwise free to pursue that internal policy most agreeable to their social or national tastes and habits.

And it is an inspiration to know that women have risen to the height to which they have been invited to climb. The Women's International Union has only been in existence since the World's Fair was held at Chicago, U.S.A., yet already it numbers some of the leading women of England, France, Germany, the United States, Belgium, Holland, Denmark, Switzerland, India, etc., on its roll of membership, and is fast becoming a powerful and influential organisation, whose force will have to be allowed for in any movement affecting women's interests. Its motto is "For God and Each Other," which is in itself an all-sufficient explanation of its purposes and its scope.

— Science Notes. —

LIQUID AIR.

It is not many years since the constituents of the air, oxygen and nitrogen, were called permanent gases, because all efforts to reduce them to a liquid state had proved unavailing. The methods employed in the attempts to liquefy these gases were those which had been successful in the case of other gaseous bodies, such as chlorine, ammonia, sulphurous acid, carbonic acid, and hydrochloric acid. Faraday was the first to liquefy these, with the exception of chlorine, and he was also successful with others not mentioned above. Chlorine differs from the other gases enumerated in being elementary in its nature, whereas the others are compounds of two elements. It was liquefied as early as 1806, and was the first instance of a substance, known under ordinary conditions as a gas, being transformed by pressure into a liquid. It is remarkable, in connection with this fact, that no other elementary gas was liquefied until more than 70 years afterwards.

The application of pressure to a gas, as a means of liquefaction, is a very natural resource, considering how much more space a gas occupies than the liquid into which it can be condensed; thus, 1,700 cubic inches of steam correspond to one cubic inch of water.

The failure of Faraday and of various other experimenters to liquefy the so-called permanent gases, may be attributed to the fact that they depended too much on the application of pressure, and too little on low temperatures. Natterer subjected the gases to a pressure of nearly 3,000 atmospheres, and Andrews succeeded in reducing them to one-five hundredth of their original bulk, and also exposed them to the action of a low temperature. The latter was led by his experiments to the discovery of the fact that, although great pressure tends to liquefy gases, there is for each gas a certain temperature, known as its critical point, above which no amount of pressure can convert the gas into a liquid. The critical temperature of oxygen, nitrogen, and the other "permanent" gases, is very low, and when they were eventually liquefied, almost simultaneously by two French chemists—Cailletet and Pictet—the pressure employed, though great, was not so high as that used by Natterer.

Liquid oxygen was first obtained at a temperature of —130° (*i.e.*, 130° Centigrade below the freezing point of water, or 230° below boiling point), and under a pressure of about 475 atmospheres.

Quite recently, Prof. Dewar, who has succeeded in producing lower temperatures than those used by Cailletet and Pictet, has liquefied oxygen at the ordinary pressure of the atmosphere at a temperature of —180°. He has also devised double vessels, with a vacuum between the outer and inner wall, in which to store the liquid gases; they can thus be kept for hours in large quantities.

There is no further difficulty in freezing the liquid oxygen; the very low temperature required is produced by the rapid evaporation of a portion of the liquid immediately it is set free from the tube containing it. It is a common experience that heat is lost when a liquid evaporates, as when water is allowed to evaporate from the surface of the skin. The more

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