WOMEN SEE STARS.

THE ASTRONOMICAL WORK OF MRS. FLEMING—HER ASSISTANTS.

Thirteen Clever Women Engaged in the Draper Memorial, Where They Examine Photographs of the Heavens, Make Catalogues, and Check Corrections.

(CORRESPONDENCE OF THE TIMES.)

BOSTON (Mass.,) March 9.—"I know that you have come to talk with women about woman's work here at the Harvard Observatory, but as I have a few moments which I can give you, I should like to tell you something of the general plan of the work before turning you over to Mrs. Fleming, particularly as she might fail to give you an idea of the extent and importance of her individual investigations."

So spoke Prof. Edward C. Pickering yesterday as he came forward to greet me in the light, pleasant rooms devoted to the Draper Memorial work, and then in the clear, concise, authoritative words of the man of science, and the kindly manner of a distinguished host, he rapidly sketched for me an outline

MRS. MINA FLEMMING.

of the methods used, and the results attained.

"There are in this room in which we are sitting more than ten tons of glass in negatives, representing the universe for the last ten years.

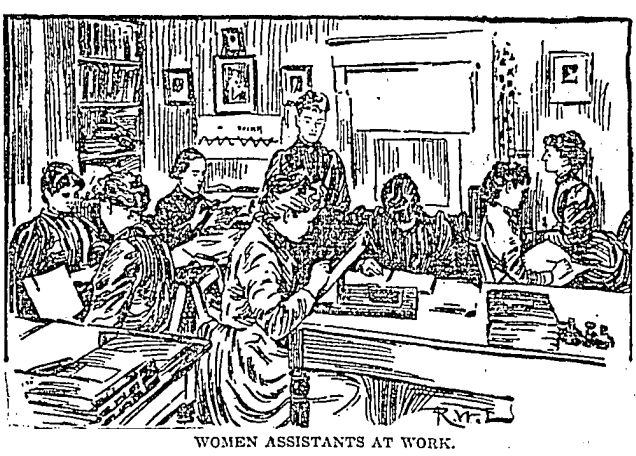
MRS. DRAPER'S GIFT.

There are two ways of photographing stars. One for the purpose of making charts, and the other for photographing the spectra of the stars, and it is about this latter work at Harvard that I want particularly to talk to you. It is supported entirely by a woman, Mrs. Anna Palmer Draper of New York, in honor of her husband, Dr. Henry Draper, who was the first to successfully photograph stellar spectra. Dr. Draper literally never went into the observatory alone. His wife always assisted him in his observations, and made all his records. In those days this was a very laborious task, owing to incompleteness and imperfections of the apparatus, and often involving working very late into the night; so that when in 1882 Dr. Draper died after a brief illness Mrs. Draper sustained the double loss of a beloved companion and the work to which she had long devoted her noblest energies. Instead of building an observatory as a monument to her husband's memory, Mrs. Draper decided to give $10,000 a year to the Harvard observatory for the purpose of carrying on the special work in which he was the pioneer. This is one of the most marked examples I know of a wife's active interest in her husband's profession. Although Mrs. Draper has done no actual work in astronomy since her husband's death, she often comes over from her New York home to investigate the results of our latest researches here.

A MONOPOLY OF THE FIFTH TYPE STAR.

Before leaving you, I want to say that all my assistants here are women, and that three-fourths of all the stars of the fifth type that are known (about fifty-five in all) have been discovered in the Harvard Observatory by Mrs. Mina Fleming, and, what is rather curious, there has not been a single one found by any one else for the last eight years, so that she has practically had a monopoly of the fifth type star. This rather goes to show that before that time astronomers had reached the limit of what could be discovered by the eye. Mrs. Fleming has developed remarkable skill in getting the greatest results possible out of the photographs, particularly in studying the spectra of stars. She has also discovered four out of the five new stars, Novae, that have been discovered in the last four years. And now may I present you to Mrs. Fleming, the head of the woman's department here?"

A bright-eyed little woman stepped



WOMEN ASSISTANTS AT WORK.

forward and plunged at once into her story.

GROWTH OF THE WORK.

"Great interest in the heavenly bodies can be traced back to the earliest Greek records; but we do not find woman in any way connected with the science until a comparatively recent date. Caroline Herschell, equally interested with her brother; Mary Somerville and Maria Mitchell were the women pioneers in astronomy. But Harvard Observatory is the first to develop a corps of trained women assistants, dealing with difficult problems as successfully as men deal with them at other observatories. When I became head of the department eight years ago, I had one assistant at the end of one month, and at the end of the year I had five. Now there are twelve. The women assistants are not engaged during the night at the telescopes, but find their time during the day sufficiently occupied in examining and discussing the photographs and the various computations therein involved. Catalogues of the plates taken have to be kept up to date, the plates compared with the charts of the part of the sky which they are supposed to represent, in order to check the correctness of the record made by the observer, and to ascertain that the region intended is contained on the plate. The chart plates are then filed carefully away and are used in the confirmation of variable stars or other interesting researches. By this method you have ready to your hand and for immediate use the material for which a visual observer might have to wait for years, and certainly for months.

SUITS WOMEN WELL.

You see the attractive place we have to work, and its charming outlook. The work is clean and delightful, and the women enjoy a great sense of liberty, as much of the work can be done at home if they prefer it. They begin by working for 25 cents an hour and average about six hours a day. As they advance they are, of course, paid more. Miss Winlock, daughter of Prof. Winlock, has done original work in determining the position of some of the stars within one or two degrees of the North and South poles."

Miss Fleming is a native of Scotland. She has a very keen eye for measurements, an alert mind for observation, and marked executive ability. In speaking of Prof. Pickering, his high devotion to his work, and consideration for his assistants, the quick tear sprang to her eyes, showing that the woman in her is not less strong than the scientist.

"Our work is not so interesting as the Draper Memorial work, but none the less important," said Mrs. Imogen Willis Eddy (daughter of N. P. Willis, the poet,) as I stepped into an adjoining room. "We do all the computing connected with the meridian circle, our special work being to locate the position of certain stars. I often say to Prof. Searle that the observer simply presses the button, and we do the rest, which is literally true. That is to say, when a star is found we make all the mathematical calculations to verify the observation, and if there is the slightest variation, even so much as three seconds in the declination, the observation has to be taken again. Harvard is the only college that employs women as mathematical computers. There are three of us here. To be really efficient a computer must understand algebra, geometry, trigonometry, the principles of astronomy and the instruments. Of course one can do routine work without this preparation, but in cases of error one is simply swamped with a less complete equipment."