THE CURIOSITIES OF CLOCKWORK.

As soon as horary instruments had been constructed an endeavor was made to utilize them at night just as in the daytime. Gnomons or sun dials could not be employed for this purpose, especially in the interior of houses. Although the time was obtained by means of a plumb line held vertically opposite the pole star, this was possible only in clear weather and in the country.

Clepsydras, or water clocks, were then alone capable of solving this problem, and so the idea occurred to illuminate them at night. It is, therefore, of clocks luminous in darkness that we are going to speak—of those of which the tradition has been perpetuated to our day, despite the most practical methods of clockwork. We shall occupy ourselves here only with the house clock or the ornamental clock, for the luminous dial of the public clocks is still of extreme utility at the present time.

In studying the history of clepsydras, we find that certain of these pieces, already very complicated, were provided with a style of lamp that permitted of seeing the hour despite the darkness. Such was the clepsydra constructed in China, and mention of which is made in the Tchan-li, a book that dates back to the year 202 before our era. The same is the case with the Arabian clepsydra that was in the mosque at Damascus in 1184. There were many others of this kind. The idea of the night light, differently applied, is found again in clocks with spring movement from the epoch of the Renaissance down to our day.

We are going to speak of some curious types in order to give an idea of the multiple means employed by clockmakers for giving the time at night.

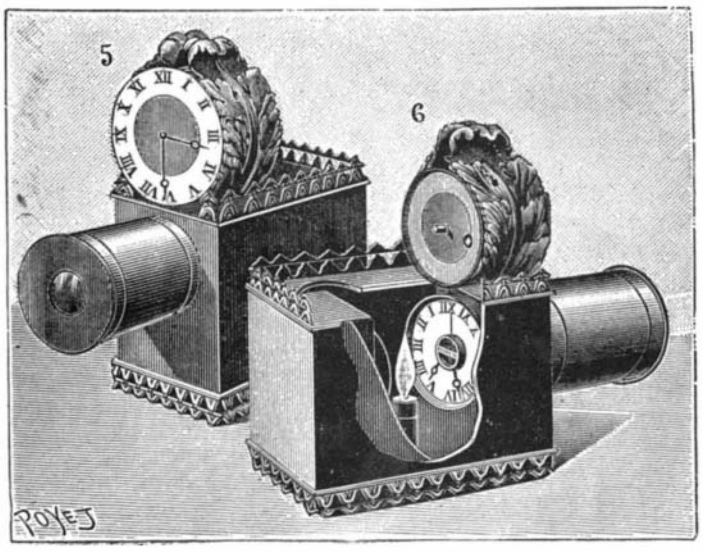
The sixteenth century was peculiarly prolific in matters of clockwork, both as regards inventions and decoration, and we are able fearlessly to assert that nothing new has been done since, in the way of ingenious conceptions. The following, for example, is a description of an alarm clock invented by Caravagius for Andre Alciat. "At the moment at which the bell struck the hours, a spark drawn from a flint by means of a pistol battery placed at the desired spot fell upon a sulphur (sic), which was ignited and lighted the wick of a candle." This kind of time piece was not unique, and we still find old specimens of it in our day. They are of finely chased gilded copper.

In Fig. 1 we reproduce a Renaissance clock of the same epoch in the form of a pyx. Beneath the dial, which is mounted upon a man's head forming a pedestal, there is a burner of a lamp in which is placed a wick that enters the oil contained in the body of the man and the foot upon which it rests. It was this lamp that illuminated the dial at night. This piece is of gilded bronze. The pedestal is finely chased and the entire surface is covered with engraving.

We have in our possession a curious clock made at Saltzburg at the beginning of the seventeenth century (Fig. 2). It consists of a plate ornamented with motifs in repousse copper and accompanied with two dials, one above the other. About the lower dial, which serves to show the time during the day, there is nothing peculiar. It is a copper disk upon which are engraved the hours, which are indicated by a very elegant steel hand. The upper dial is entirely different, and its composition has pretensions to the mysterious. The hours are printed in black upon a glass disk which is fixed in the plate forming the front of the case. It is, therefore, immovable. Behind this disk, and applied almost immediately against it, there is another glass plate upon which is painted a small figure in black holding in its hand a wand that serves to mark the hours.

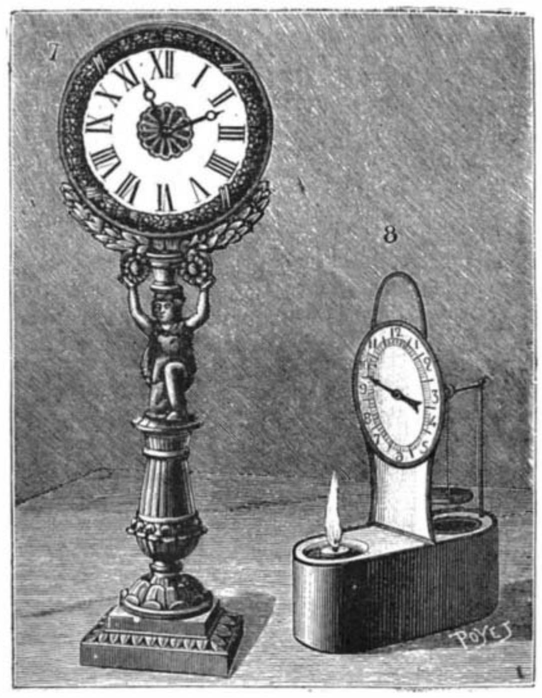
This second glass plate is circular and at its circumference, behind an ornament, there is concealed a toothed wheel that is sealed to it. This wheel engages with a dial train that corresponds to that of the lower dial, so that the movement, in running, actuates the day and night dials at the same time. The night dial is illuminated by a lamp placed behind it. As the two glass plates are transparent, it is necessary to make some examination in order to understand the system, for the two plates of glass seem to make but one, and to form one and the same dial only.

In our collection we have also a night lamp that serves to show the time (Fig. 3), and that constitutes a genuine clepsydra. These kinds of clocks were relatively common in the seventeenth century. They were especially clocks for studies. They consisted of a lamp placed at the base of a glass receptacle mounted vertically by a screw upon a tin foot, to which it was fixed by two strips of the same metal. Upon one of these latter (the one facing the burner of the lamp) was read the hours of the night cast in relief. They began at 4 o'clock in the afternoon, the hour at which the lamp was to be lighted in winter, and ended at 7 o'clock in the morning. The glass receptacle was removed by unscrewing it from its foot when it became necessary to refill it with oil. After being put back in place, and the lamp having been lighted, it was the level of the oil that marked the hour in descending in measure as the combustion proceeded.

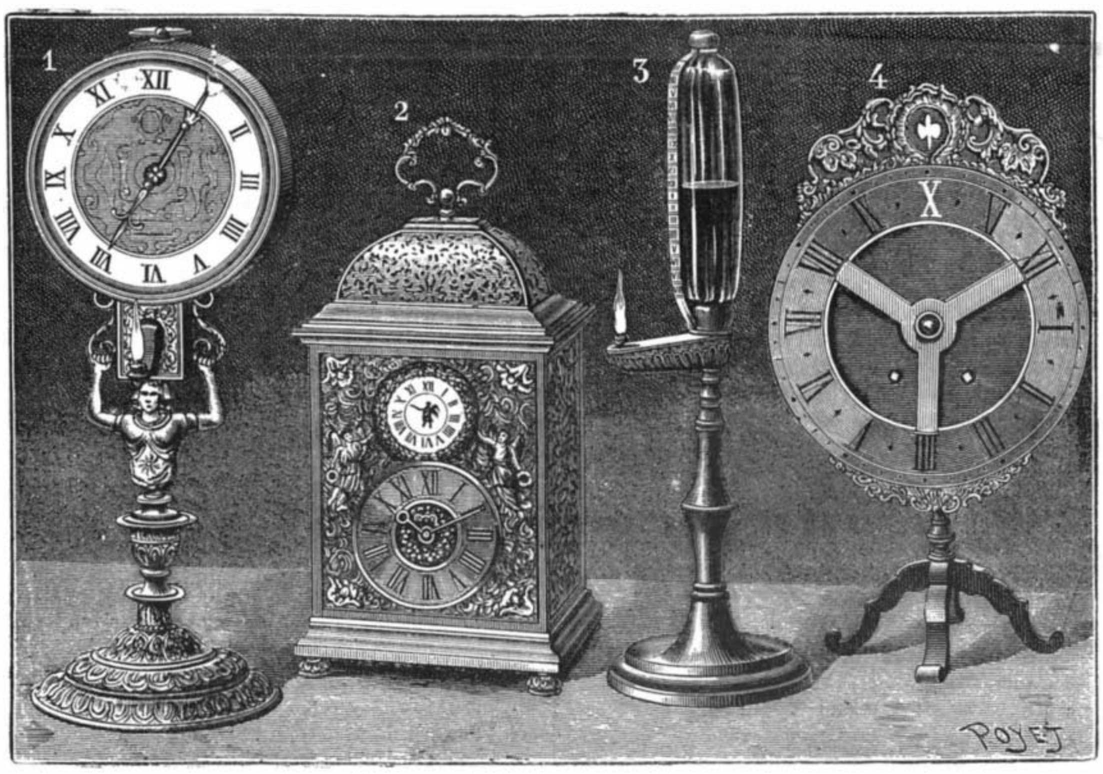


Figs. 5 and 6.—LANTERN CLOCK.

Fig. 5.—External view. Fig. 6.—Details of the internal mechanism.



Figs. 7 and 8. ILLUMINATED CLOCKS.



Figs. 1 to 4.—ANCIENT CLOCKS.

Fig. 1.—Dutch clock. Fig. 2.—Mysterious clock. Fig. 3.—Lamp clock. Fig. 4.—Dutch illuminated clock.

Much later on, in 1819, a clockmaker named Gabry, of Liancourt, utilized the same principle for constructing a system of night lamp of which we possess a specimen (Fig. 8). It is a reminiscence of the antique Indian (or Hindoo?) clepsydra. It consists of two juxtaposed porcelain cylinders that communicate by a conduit formed at the base of the partition that separates them. Above this partition there rises a plate of iron with a dial painted upon one of its faces. The two vessels are filled with oil, and in the one in front of the dial is placed a night lamp to illuminate it. In the other there is suspended a float through a cord that passes around a pulley mounted upon a horizontal axis ending in the center of the dial. This float descending in measure as the combustion of the oil proceeds, carries along with it the hand fixed upon the axis in front of the dial and thus marks the hours.

The precision of these clocks must certainly have been most mediocre, whatever may have been the care taken to direct the flame of the wick. A Dutch night lamp of the eighteenth century indicates to us a new combination (Fig. 4). The hours are formed in open work upon the metallic disk forming the dial, which revolves and presents all the hours in succession beneath a dove, which is likewise in openwork and serves as a pointer. A light placed upon the case inclosing the movement thus renders both the hour and the dove luminous in the midst of darkness. This piece, which is of genuine interest, is entirely of polished copper. The dial alone is silvered.

In Schubler's Architecture we find engravings of two clocks dated 1724. One of them has a luminous dial that projects the hour directly upon the floor with a considerable enlargement that is effected by the dial itself, which is composed of a lens. The other is a true magic lantern with an objective that projects the hour upon the wall. These two clocks, of large size, are very richly ornamented, and are of a beautiful decorative aspect, although in a somewhat questionable taste.

The idea of this magic lantern clock has been taken up in other proportions and under various forms. We own a mantel clock dating back to the first empire (Figs. 5 and 6), and consisting of a copper case, having upon its face a magic lantern objective, behind which there is a glass dial upon which the hours are painted.

This transparent dial is actuated by an almost invisible train which is run by the movement of the clock placed upon the upper part of the case. The dial of this movement is above the objective and thus gives the hour during the day. Behind the dial that is in the case there is a lamp which is lighted at night so as to obtain a luminous projection of the dial of a very large diameter, either upon a wall or upon a screen.

In 1828, a Mr. Rehart took out a patent for a magic lantern serving to amplify the dial of a watch. Under the empire, many night clocks were brought out. The most common were composed of a metallic ring into which was set a ground glass dial carrying the hours painted in black (Fig. 7). In the center of this dial there was a chased copper rose behind which was concealed a watch movement. A night lamp placed behind illuminated the hands, and the hours stood out in black upon the white disk.

This dial was mounted upon a foot of chased bronze of which the decorative motif varied to infinity. Nevertheless, as in the specimen that we reproduce, it was frequently in the form of a human figure.

These different clocks are, as may be seen, somewhat crude, and certain of them are far from offering very serious guarantees of running.

In our day night clocks of various styles have been constructed. But all this responds but imperfectly to the object proposed, and it may be concluded that the time of night will be known very much better from the bells of clocks than from the light that illuminates them.

It is especially starting from the seventeenth century (1676) that with timepieces giving the hour at will the problem has been solved. We have thus, according to requirements, the hour, the half, the quarter, and sometimes even the minute. At present the traveling clock, with its large bell, has had the last word to say of the hour of night, and is advantageously replacing all the clocks and night light arrangements that have been invented since centuries.—M. Planchon, in La Nature.

NEW CHEMIST'S WASH BOTTLE.

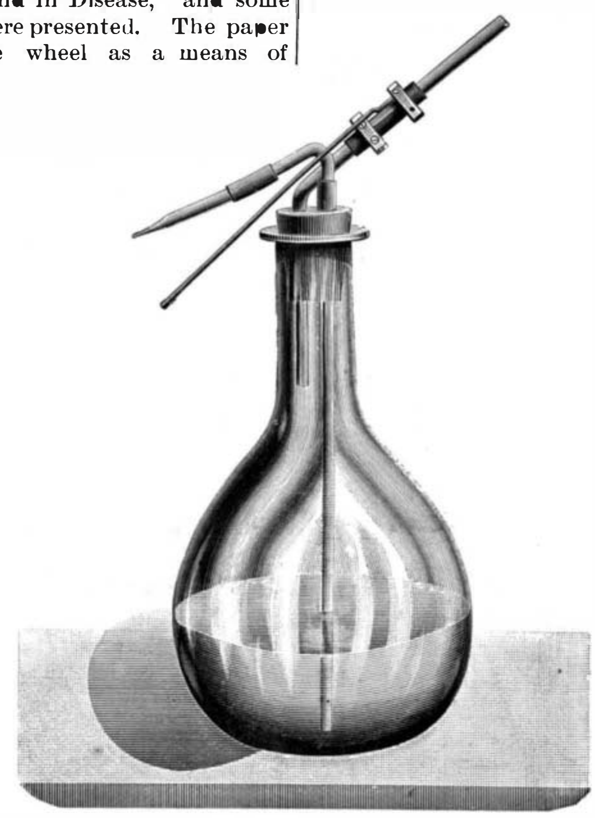
The wash bottle shown in the cuts represents one of a kind which I have used for three years, and it has proved so convenient, not only for hot water wash bottles, but also other wash bottles, that I think it will prove of interest to your chemical readers.

One cut represents the bottle complete; the other shows it in use, and also shows a large scale view of the valve. Its construction is obvious. The wire crosses a piece of rubber tubing. When the wire is depressed it squeezes the tubing against the wooden block on which it is mounted and thus closes it valve-fashion.

The middle finger controls the wire of the valve, allowing the free use of the first finger to direct the stream—a great improvement on other similar apparatus.

When the bottle is reversed, the middle finger also controls the stream issuing from the mouth tube—a very convenient feature.

WASH BOTTLE IN USE, WITH VIEW OF VALVE.



NEW WASH BOTTLE.

After a short use of the bottle, one soon becomes accustomed to the mechanism, so that the mouth and hand work together. The air chamber ordinarily above the water is sufficient to eject the water for five or ten minutes, and with the hot water bottle it is only necessary to shake the water, and the steam liberated is ample to force the water from the top. Another great advantage is that one runs no risk of burning the mouth, as the valve prevents the steam returning until the mouth is removed.

GEO. C. JAMES, Chemist.

Inventions Reduce the Cost of Building.

The Real Estate Record commented some time ago upon the immense reduction that has been made within the last decade in the cost of building. Office buildings that cost $1.50 per cubic foot, and even more, can be produced by modern methods for 30 or 40 cents a cubic foot. This reduction in cost is due in no slight measure to the employment of mechanical devices in building operations. The hod carrier, elevator, derrick, and other devices worked by steam, which have superseded the slow hand labor, are too well known to be mentioned. The employment of steam power in the mechanical operation of building has, however, by no means reached its limit. At the New York building, now erecting on the block front between Waverly Place and Washington Place, passers-by may see a steam stone crusher at work preparing material for the foundation. A few hands are able to do with precision an amount of work which formerly required a small regiment of men. On the line of the new Lexington Avenue cable road a cement stone mixer worked by steam is in operation, and attracts the attention of passers-by.

For Obesity.

Take no water or other fluid at any time, says the Medical Times and Register, except one cup of any desired hot drink, just before rising from the table. Use no liquids while eating. Avoid sugar, nuts, and pastry. Eat nothing between meals. Confine the diet to lean beef, mutton, chicken, turkey, fish, eggs, oysters, with one slice of stale bread well dipped, the bulk of the meal being of tomatoes, celery, spinach, turnips, cabbage leaf, but not the fleshy mid-rib, and fresh or dried fruits, cooked without sugar, such as apples, peaches, plums, prunes, prunellas.

A little cheese is permissible; coffee, tea, skimmed milk or buttermilk after eating, as stated. Exercise should be taken, running being most effectual, before breakfast or before going to bed.

Healthfulness of Bicycling.

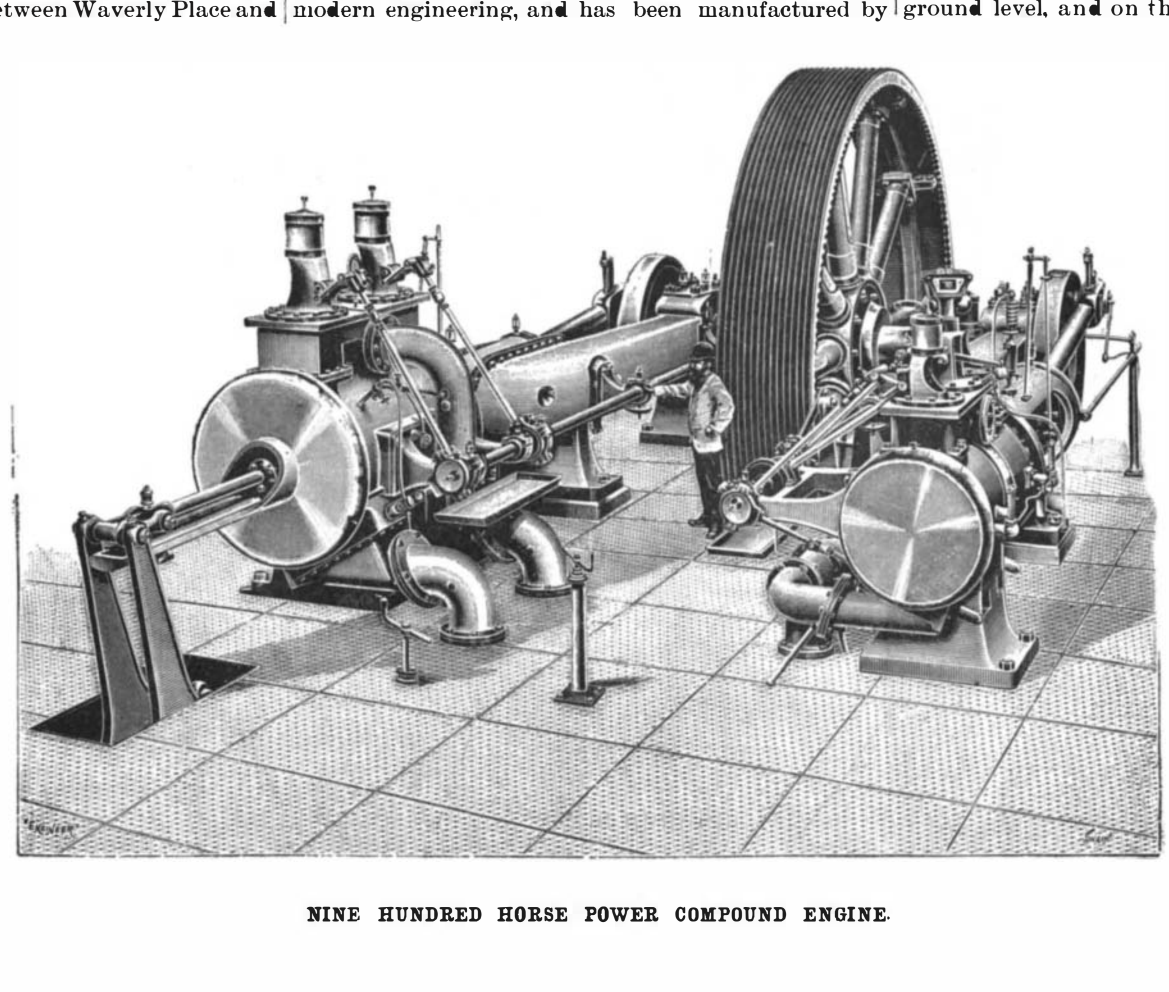
An interesting paper was read recently before the New York Academy of Medicine, on "The Influence of the Bicycle in Health and in Disease," and some very important statistics were presented. The paper warmly recommended the wheel as a means of healthful exercise. The conclusions were based upon examinations of a number of men who had used the wheel constantly for periods varying from five to fifteen years. During this time each of these riders had ridden more than 5,000 miles and less than 30,000 miles. It was found that the average chest expansion of these riders was 1 4-7 inches. The chest of the average man expands only one inch. In the strength and general condition of the heart the bicyclists had a similar advantage, and a considerably increased lung power was also observed. There was also noticeable an harmonious development of all the muscles, and in no case was any deformation of the spinal column or other part to be found. The criticism that the continued use of the wheel merely develops the muscles of the legs at the expense of other parts was not found to be true in any of these cases. The writer of the paper, however, condemned long distance racing as injurious, and offered a general caution against excessive and exhaustive feats of bicycle riding.

NINE HUNDRED HORSE POWER COMPOUND ENGINE.

The engine here illustrated is a fine specimen of modern engineering, and has been manufactured by the well-known engine makers, Messrs. Robey & Co., Limited, of the Globe Works, Lincoln. The cylinders are placed side by side, with the fly wheel in the center. The diameter of the high pressure cylinder is 24 in., low pressure 40 in., and stroke 48 in.; and with a steam pressure of 100 lb. per square inch the engine will, when condensing, give off 900 indicated horse power. A condenser, of the injection type, worked by an extension of the low pressure piston rod through a rocking lever, is placed at the rear of the low pressure cylinder, and at a lower level; the air pumps are single acting, two in number, each 23½ in. diameter. The main shaft is exceedingly massive, being 15½ in. diameter in the center, the main bearings being 12 in. diameter by 24 in. long, thus giving ample bearing surface.

The power is transmitted by means of a fly wheel, 18 ft. diameter, grooved for fourteen ropes, 1¾ in. diameter, and the rim is built up of ten segments, the latter being carried by ten arms, which are fastened in the central boss by double cotters. The main feature, however, in this engine is the trip valve gear, which is Richardson and Rowland's patent, and works with a smoothness and precision which leaves nothing to be desired. The inlet valves on the high pressure cylinder are of the double beat type, and are actuated by trip levers, which again receive their motion from a cross shaft driven from the main shaft of the engine by cut gearing. The trippers which lift the valve are coupled to the governor, which by means of a simple motion adjusts the cut-off from zero to ¾, by sliding the tripper into longer or shorter communication with the tripping lever. This arrangement has been found in numerous examples to be most effective, and controls the speed of the engine within less than one per cent on ordinary variations in load. The exhaust valves are underneath the cylinders and have large openings with a very small movement, thus giving a free exhaust, and draining the cylinders effectually. A large receiver is situated between the two cylinders, into which the high pressure exhausts; here it is reheated by means of a live steam coil, and enters the low pressure cylinder at a slightly enhanced pressure.

The economy of steam consumption in this type of engine has been proved to be very considerable, and with the engine illustrated the consumption has been brought to the lowest practicable point. As a proof of the accurate balancing of all parts, the engine was erected on a temporary foundation of timber and moulding boxes, at a height of 10 ft. from the ground level, and on this slight foundation run at the full speed of 75 revolutions per minute, with scarcely any perceptible vibration. The engine is for driving a large mill in Russia, and has been specially designed to render transport easier, the girder bed being made in two halves, and bolted securely together, and a foot placed in the center, whereby absolute rigidity is obtained. The fly wheel has been turned dead true, a result seldom obtained with equal accuracy with so large a wheel. We are indebted to the Engineer, London, for our cut and the above particulars.



NINE HUNDRED HORSE POWER COMPOUND ENGINE.

MORTUARY tables show that the average duration of the life of women, in European countries, is something less than that of men. Notwithstanding this fact, of the list of centenarians collected by the British Association a fraction over two-thirds were women.