

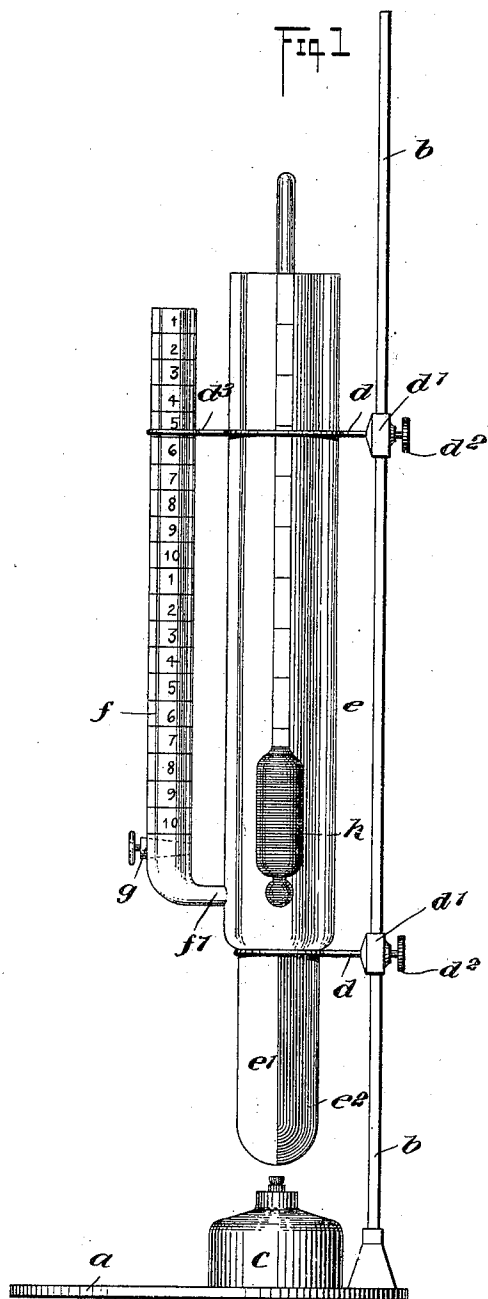
No. 685,538.

Patented Oct. 29. 1901.

E. A. STARZ.
URINE TESTER.

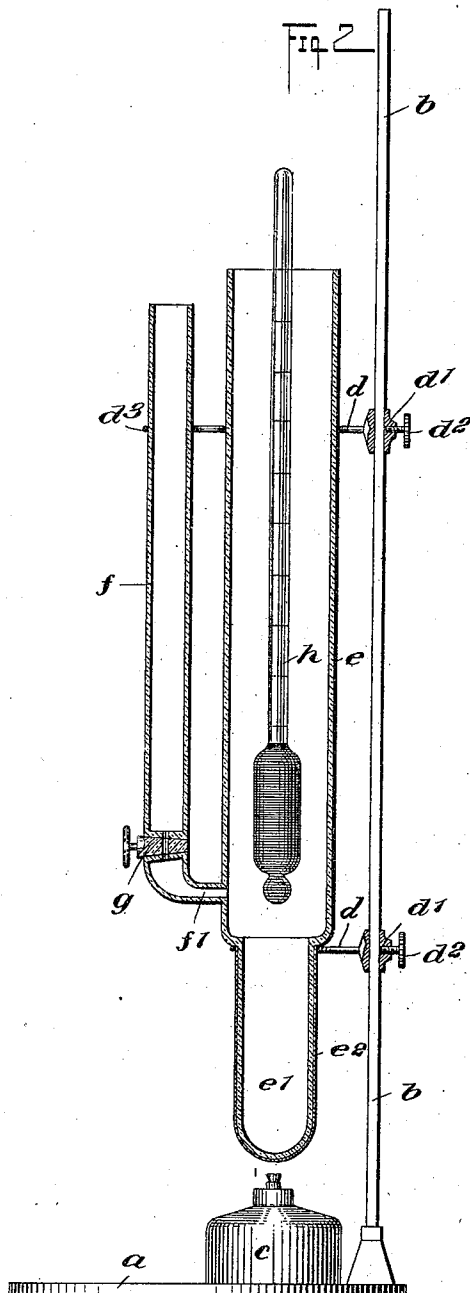
(Application filed Feb. 18, 1901.)

(No Model.)



WITNESSES:

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UNITED STATES PATENT OFFICE.

EMIL ALFRED STARZ, OF HELENA, MONTANA.

URINE-TESTER.

SPECIFICATION forming part of Letters Patent No. 685,538, dated October 29, 1901.

Application filed February 18, 1901. Serial No. 47,763. (No model.)

To all whom it may concern:

Be it known that I, EMIL ALFRED STARZ, a citizen of the United States, and a resident of Helena, in the county of Lewis and Clarke and State of Montana, have invented new and useful Improvements in Urine-Testers, of which the following is a full, clear, and exact description.

My invention relates to urine-testers, and has for its object to provide a simple and compact device for readily and accurately performing the usual urine tests—viz., the determination of the specific gravity, the testing for albumen, and the testing for sugar, (glucose,) both qualitative and quantitative.

The invention will be fully described hereinafter and the features of novelty pointed out in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both figures.

Figure 1 is a front elevation of my improved urine-tester, and Fig. 2 is a central sectional elevation thereof.

The improved apparatus comprises a suitable base *a*, with an upright *b* rising therefrom at one end. On this base is adapted to be supported a heating device, such as an alcohol-lamp *c*, or a gas-burner might be used. Rings *d* are connected with slides *d'*, mounted to move on the upright *b* and adapted to be locked by screws *d''*. These rings support a glass tube having a wide upper portion *e* and a narrow lower portion *e'*. The latter is made of glass capable of withstanding considerable heat and is provided on its back with a coating of white enamel and also with a strip of blue enamel *e''*. Laterally of the main tube *e e'* is located a communicating auxiliary tube *f*, connected at *f'* with the upper tube portion *e* and graduated in any suitable manner—for instance, as shown, for two cubic centimeters each subdivided into tenths. The connection of the auxiliary tube with the main tube is controlled by a cock *g*. The upper end of the auxiliary tube is held by a loop *d'''* on the upper ring *d*. Into the main tube *e* may be dipped a urinometer *h* of ordinary construction.

The apparatus is used as follows: To determine the specific gravity, the cock *g* is

closed, the tube *e* is filled with urine to about two-thirds of its height, and the tube *f* to the top. The urinometer *h* is then slowly placed into the urine, and the cock *g* is then opened to admit sufficient additional urine to cause the urinometer to float quietly—that is to say, without bobbing up and down. The urinometer is graduated from one thousand to one thousand and forty-five, as usual. By proceeding as described the formation of bubbles is avoided and an accurate reading is insured.

To test the urine for albumen, the cock *g* should be closed and the tube *f* filled with urine. Concentrated nitric acid is then poured into the bottom portion *e'* of the main tube, filling this portion about one-half or two-thirds. Then the cock *g* is opened slowly, allowing the urine to pass drop by drop on top of the nitric acid. The presence of albumen in the urine will cause the formation of a well-defined white ring at the contacting surfaces of the urine and of the nitric acid, and this ring may be clearly seen through the transparent front portion of the tube *e'* against the dark background formed by the blue-enamel strip *e''*. It will be seen that the customary employment of a pipette is done away with, and the observation of the reaction is greatly facilitated.

The qualitative test for glucose (sugar) is made as follows: The tube *e'* is filled to about two-thirds with Haines' solution, and (the cock *g* being closed) the auxiliary tube *f* is filled with urine. The lamp *c* is then lighted to cause the solution to boil, and when boiling has continued for about a minute the cock *g* is opened slowly to admit the urine drop by drop on top of the testing solution. The presence of glucose in the urine will be revealed by the appearance of the characteristic reddish-yellow ring or clouding, which will be readily observable through the transparent front of the tube *e'* against the light-colored background formed by the white enamel on the back of said tube.

The quantitative test for glucose (sugar) is carried out in the following manner: The cock *g* being closed, the tube *f* is filled with exactly two cubic centimeters of urine, while a like amount of Fehling's solution is poured into the tube *e'*. Then the urine is admitted drop by drop by opening the cock *g* until the

blue color of the solution vanishes entirely. This can be readily determined by looking against the white-enamel strip on the back of the tube *e'*. It being known how much
5 glucose is required to reduce the copper in a given quantity of Fehling's solution, (0.005 glucose for one cubic centimeter of the solution,) the contents of glucose can be readily
10 calculated. For instance, if 0.75 cubic centimeters of urine have been used to reduce the two cubic centimeters of Fehling's solution it follows that there were twice 0.005 or 0.01
of glucose in 0.75 cubic centimeters of urine, or 1.33 per cent. of sugar. When the percent-
15 age of glucose is high, it is advisable to dilute the urine in the proportion of one to two.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

- 20 1. A urine-tester, comprising two communicating tubes one of which is provided with a downward extension, provided with a light-colored background, and a cock controlling the communication of said tubes.
- 25 2. A urine-tester, comprising two communicating tubes one of which is provided with

a downward extension, provided with a dark background, and a cock controlling the communication of said tubes.

3. A urine-tester, comprising two communicating tubes one of which is provided with a downward extension, provided with a light-colored background and with a dark background adjacent thereto, and a cock controlling the communication of said tubes. 30

4. A urine-tester, comprising a base, an upright connected therewith, a slide movable on the upright, means for fastening the slide, two communicating tubes supported by said slide above the base, one of said tubes being
40 provided with a downward extension provided with a light-colored background and with a dark background adjacent thereto, and a cock controlling the communication of said tubes. 35

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 45

EMIL ALFRED STARZ.

Witnesses:

EDWARD HORSKY,
CHARLES R. GARLOW.