

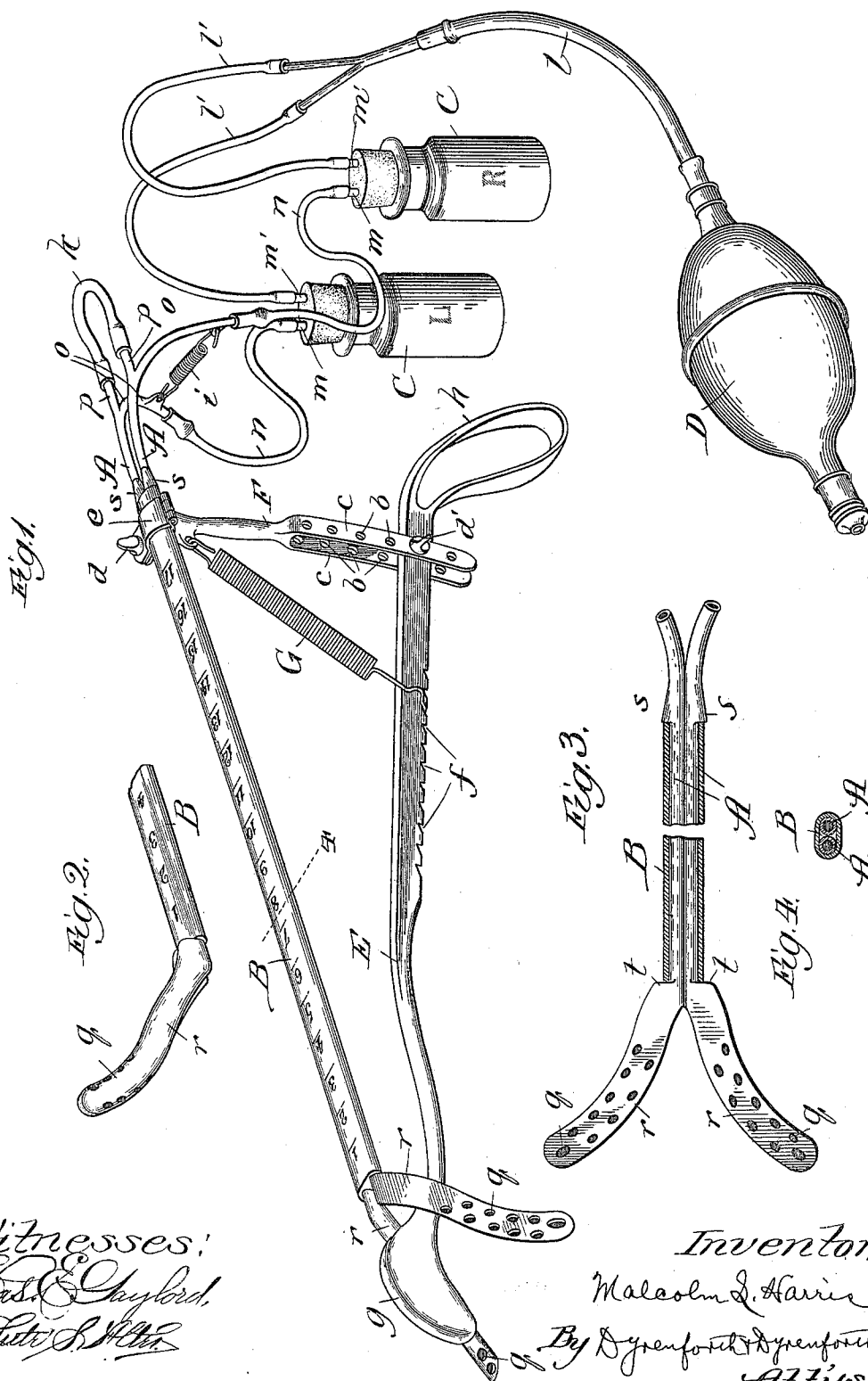
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M. L. HARRIS.
URINE SEGREGATOR.

(Application filed Mar. 21, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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URINE-SEGREGATOR.

SPECIFICATION forming part of Letters Patent No. 617,016, dated January 3, 1899.

Application filed March 21, 1898. Serial No. 674,643. (No model.)

To all whom it may concern:

Be it known that I, MALCOLM L. HARRIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Urine-Segregators, of which the following is a specification.

The object of my invention is to provide an apparatus for obtaining segregated samples of urine from the separate kidneys for determining the location, nature, and extent of diseases of those organs.

Heretofore owing to the fact that the urine from the separate kidneys when drawn off through the urethra has been commingled it has been impossible to determine from the urine test alone which of the kidneys was affected or whether or not both were affected, and to ascertain this fact it has frequently been found necessary to open the abdomen of the patient to permit the direct inspection of the organs, after which a separate operation must be resorted to for the removal of one of them if the conditions demand it.

To effect the object of my invention in the best manner, it is essential that separate catheters be passed simultaneously through the urethra into the bladder, that they be caused to diverge within the bladder to bring each into proximity with one of the ureters, that the bladder be caused by pressure exerted upon the wall of the adjacent cavity to form a temporary septum between the divergent portions of the catheters to isolate the ureters from each other, and thus prevent commingling of the urine entering the bladder from the separate kidneys, and that means be provided for withdrawing the accumulating urine simultaneously through the two catheters into separate receptacles for preservation. All these functions are performed by means of the apparatus which I have devised and which forms the subject of this application for a patent. It should be observed, however, that while it is preferable to obtain samples from the opposite kidneys simultaneously through the two divergent catheters, as above explained, the objects of the invention may be attained, though less satisfactorily, by employing a single catheter adapted to be brought into proximity with either ureter, and in this way by segregating the

urine on that side by means of the temporary septum drawing samples from the separate kidneys at different times or from one kidney only, as circumstances require. As this involves only the omission of one of the catheters it does not constitute a substantial change from the complete apparatus and is included within my invention.

In the accompanying drawings, which illustrate my apparatus in the preferred form, Figure 1 is a perspective view of the complete instrument; Fig. 2, a similar view showing the proximal portion, with reference to the patient, of the double catheter and inclosing sheath, the former being turned into position for insertion into the urethra; Fig. 3, a broken plan view of the duplex catheter turned to bring the proximal ends into a divergent position, the inclosing sheath being shown in longitudinal section; and Fig. 4, a cross-section of the duplex catheter and inclosing sheath.

A A are two catheters alike in form except that they are right and left. Throughout the straight and uniformly cylindrical portion of their length they are inclosed within a sheath B about nineteen centimeters in length, elliptical in cross-section, and graduated in centimeters along its upper surface, and while free to turn with but slight frictional resistance on their longitudinal axes the catheters are maintained against longitudinal displacement within the sheath by shoulders *t* and *s*, the shoulders *s* being formed after the incase-ment by soldering pieces of metal to the catheters. Beyond the sheath B the proximal portions *r* of the catheters are flattened and curved, as shown, and have perforations *q* in their meeting faces, which are uppermost when the instrument is in operative position within the bladder, and in their edges. The curved portion forms an arc of about sixty degrees, with a radius of thirty-five millimeters, and it does not pass at once into the straight portion, but has a slight angular displacement about three or four millimeters in length. A transverse section of the divergent portion of each catheter is approximately a semicircle, so that when the flattened surfaces of the two catheters are opposed an approximate cylinder is formed. The distal portions (with reference to the patient) are

bifurcated, one branch *p* extending approximately in line with the incased portion and the other branch *o* curving outward in about the same plane as the proximal portion, forming about a quadrant of a circle, the same as the curved end of an ordinary male sound. The branch *o* of each catheter is connected to a flexible rubber tube *n*, which at the opposite end is fitted to a nipple *m*, extending through the stopper of a vial C. An exhaust-bulb D is connected by flexible tubes *l' l'* to corresponding nipples *m'* in the stoppers of the vials. A rubber tube *k*, fitting over the ends of the branches *p* of the catheters, permits these branches to be opened and closed at will for purposes hereinafter explained. A spiral spring *i*, arranged to connect at will the branches *o* of the catheters, serves to maintain the proximal ends in divergent position within the bladder, and the branches *o* afford convenient leverage for turning the catheters after they have been inserted through the urethra of the patient, and the curves of the two extremities being in the same plane the distal end will always indicate the exact direction of the proximal end.

E is a metal lever about twenty-nine centimeters in length, with a handle *h* at the distal end and provided at its proximal end with a curved and flattened enlargement *g*. The sides of the lever are flattened throughout. The forward portion for nearly one-half the length of the lever forms a compound curve, and rearward from this curve the lever is provided on its lower side with a series of notches *f*. A bar F, provided upon its upper end with a hinged clamp *e* and set-screw *d* for securing it detachably to the sheath B and having its lower portion forked to embrace the lever E, serves to connect the lever and sheath adjustably together, the branches *c* of the forked lever being provided with perforations *b* to receive a pin *d'*, which passes through a corresponding perforation in the lever and serves as a fulcrum. A spiral spring G, linked at its top to the upper end of the bar F and provided at its lower end with a hook to engage one of the notches *f* in the lever, operates to draw the lever and catheters together with a degree of tension depending upon the notch with which the connection is made and upon the adjustment of the bar F.

The instrument is used in the following manner: The patient, male or female, is placed comfortably upon a table in the ordinary lithotomy position, the hips being as high as the shoulders. The catheter portion of the instrument, with the flattened surfaces in contact, forming practically a single catheter, is then introduced into the bladder in the ordinary manner and the connecting-bar secured to it by means of the clamp. The lever, passed between the forked ends of the connecting-bar, is then introduced into the vagina in the female or the rectum in the male, the fork holding it in mid-line. When

introduced to the proper distance, which is indicated by the registering of the perforation in the lever with the perforations in the fulcrum-bar, the parts are secured together by means of the pin, and thereupon the large spiral spring is hooked to the required notch on the lever. The part of the instrument within the bladder is now opened by slowly and gently rotating each catheter about its longitudinal axis until each proximal end is directed outward and backward. The angle subtended posteriorly by the ends of the catheter should be from about one hundred to one hundred and ten degrees, and they are held in this position by connecting them together by means of the small spiral spring. As the proximal ends of the catheters are spread apart in the manner described the end of the lever within the vagina or rectum passes between them through the force of the large spiral spring, thus forming a septum extending longitudinally along the base of the bladder, whereby the divergent ends of the catheters occupy the bottoms of small pockets, separated from each other by a perfect temporary septum.

The ureters open, one on each side of the temporary septum, near the base of the delivity and each in the immediate vicinity of the end of a catheter. By producing a very slight exhaustion of the air in the vials by means of the bulb the urine as fast as it escapes from the ureters passes directly into the catheters through the perforations and flows into the vials right and left, respectively. Before attaching the vials to the catheters the pockets in the bladder may be thoroughly cleansed by irrigation, if deemed desirable, by connecting an irrigator with the short straight tip on the distal end of one catheter and closing with the finger the discharge-tip of the same catheter, thus forcing the water in through one catheter and out through the other. If one of the catheters should become clogged while in operation, irrigation may be resorted to in the same way to cleanse it without the removal of the instrument. When not used for irrigating, the tips must be kept closed, and this is most conveniently done by passing the ends of the short rubber tube over them.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for obtaining a segregated sample of urine from a kidney, the combination with a catheter having a deflected terminal portion, whereby after introduction into the bladder it may be brought into proximity with one of the ureters, of a lever, adapted for insertion into the cavity adjacent to the bladder, a fulcrum connection for the lever and catheter, a spring connecting the same two members, and operating to draw the forward end of the lever toward the catheter, to produce in the bladder a temporary septum between the ureters, and thus isolate them

from each other, and a liquid-exhaust for withdrawing the accumulating urine through the catheter, substantially as described.

2. In an apparatus for obtaining segregated samples of urine from the separate kidneys, the combination of a duplex catheter having its proximal portions deflected, whereby, when rotated on their longitudinal axes after insertion into the bladder, the deflected portions are caused to diverge into proximity with the opposite ureters, a sheath incasing the straight portion of the duplex catheter, a lever adapted for insertion into the cavity adjacent to the bladder, a fulcrum connection for the lever and incased duplex catheter, a spring connecting the same members and operating to draw the forward end of the lever between the divergent portions of the duplex catheter, to produce in the bladder a temporary septum between the ureters and thus isolate them from each other, and a liquid-exhaust for withdrawing the accumulating urine through the catheters, substantially as described.

3. In an apparatus for obtaining segregated samples of urine from the separate kidneys, the combination of a duplex catheter, revolvably incased within a sheath, and having flattened and deflected proximal portions provided with perforations, a lever, adapted for insertion into the cavity adjacent to the bladder, a fulcrum connection between the lever and incased double catheter, a spring connecting the same members and operating to draw the forward end of the lever between the divergent portions of the duplex catheter, to produce in the bladder a temporary septum between the ureters and thus isolate them from each other, and a liquid-exhaust for withdrawing the accumulating urine through the catheters, substantially as described.

4. In an apparatus for obtaining segregated samples of urine from the separate kidneys, the combination of a duplex catheter revolvably incased within a sheath, and having flattened and deflected proximal portions provided with perforations, and with bifurcated distal portions, one branch serving for the attachment of a liquid-exhaust and the other for the attachment of an irrigator, a lever adapted for insertion into the cavity adjacent to the bladder, a fulcrum connection between the lever and incased duplex catheter, and a spring connecting the same members and operating to draw the forward end of the lever between the divergent portions of the duplex catheter, to produce a temporary septum between the ureters and thus isolate them from each other, substantially as described.

5. In an apparatus for obtaining segregated samples of urine from the separate kidneys, the combination of a duplex catheter revolvably incased within a sheath, and having flattened, deflected and perforated proximal portions and bifurcated distal portions, one branch serving for the attachment of a liquid-exhaust and the other for the attachment of

an irrigator, a lever having an enlarged forward end and provided with notches on its lower side, and adapted for insertion into the cavity adjacent to the bladder, a fulcrum-bar having means at its upper end for detachable connection with the incased duplex catheter, and forked at its lower portion to receive the lever, and provided at its forked portion with means for adjustable fulcrum connection with the lever, and a tension-spring, linked to the fulcrum-bar at one end and provided with a hook at its lower end for engagement with one of the notches of the lever, whereby the forward end of the lever is drawn between the divergent portions of the duplex catheter, to produce a temporary septum in the bladder between the ureters, and thus isolate them from each other, substantially as described.

6. In an apparatus for obtaining segregated samples of urine from the separate kidneys, the combination of a duplex catheter, A, revolvably incased within a sheath, B, and having the flattened, deflected and perforated proximal portions *r* and bifurcated distal portions *p* and *o*, for connection respectively with an irrigator and a liquid-exhaust, a spring *i* for connecting the branches *o* at will, a lever E having a handle *h* at its distal end and an enlargement *q* at its proximal end, an adjustable fulcrum connection between the incased duplex catheter and the lever near their distal ends, and a tension-spring connecting the same members, whereby the forward end of the lever is drawn between the deflected proximal portions of the catheters when they are turned into divergent position, substantially as described.

7. An apparatus for obtaining segregated samples of urine from the separate kidneys, comprising in combination the catheters A having the deflected, flattened and perforated proximal portions *r* and distal branches *o* and *p*, rubber tube *k* for closing the branches *p* and spring *i* for connecting the branches *o*, metal sheath B incasing the catheters and provided on its upper surface with a graduated scale, lever E having the handle *h*, enlargement *q* at its forward end and notches *f*, fulcrum-bar F having the clamp *e* and set-screw *d* for detachably connecting it at its upper end to the sheath B, and having its lower portion forked and perforated for adjustable connection by means of a pin *d'* to the lever E, spring G, linked to the upper end of the fulcrum-bar F, and having a hook at its lower end to engage the notches *f* on the lever, vials C connected through their stoppers with the branches *o* of the catheters, by flexible tubes, and exhaust-bulb D connected with the vials C through their stoppers, substantially as described.

MALCOLM L. HARRIS.

In presence of--

J. H. LEE,

M. J. FROST.