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A
S Y S T E M
OF
S U R G E R Y :

BY ✓

BENJAMIN BELL,

MEMBER OF THE ROYAL COLLEGES OF SURGEONS OF EDINBURGH AND
IRELAND, ONE OF THE SURGEONS TO THE ROYAL INFIRMARY,
AND FELLOW OF THE ROYAL SOCIETY OF EDINBURGH.

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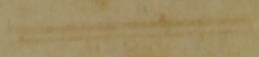
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EXPERIMENT

ON THE

GRAVITY



Part I.

FIGURE 1. A horizontal line is drawn across the page. A vertical line is drawn from the center of the horizontal line down to the bottom of the page. A small circle is drawn at the intersection of the two lines. A small square is drawn at the top of the vertical line, centered under the horizontal line. A small triangle is drawn at the bottom of the vertical line, centered under the horizontal line. A small diamond is drawn at the left end of the horizontal line. A small hexagon is drawn at the right end of the horizontal line. A small octagon is drawn at the top of the vertical line. A small decagon is drawn at the bottom of the vertical line. A small dodecagon is drawn at the left end of the horizontal line. A small tetradecagon is drawn at the right end of the horizontal line. A small hexadecagon is drawn at the top of the vertical line. A small octadecagon is drawn at the bottom of the vertical line. A small triacontagon is drawn at the left end of the horizontal line. A small hexacontagon is drawn at the right end of the horizontal line. A small enneacontagon is drawn at the top of the vertical line. A small centagon is drawn at the bottom of the vertical line. A small hectagon is drawn at the left end of the horizontal line. A small vigintigon is drawn at the right end of the horizontal line. A small triacontigon is drawn at the top of the vertical line. A small hexacontigon is drawn at the bottom of the vertical line. A small enneacontigon is drawn at the left end of the horizontal line. A small centigon is drawn at the right end of the horizontal line. A small hectigon is drawn at the top of the vertical line. A small vigintigon is drawn at the bottom of the vertical line.

Part II.

The first part of the experiment is described in Part I. The second part of the experiment is described in Part II. The third part of the experiment is described in Part III. The fourth part of the experiment is described in Part IV. The fifth part of the experiment is described in Part V. The sixth part of the experiment is described in Part VI. The seventh part of the experiment is described in Part VII. The eighth part of the experiment is described in Part VIII. The ninth part of the experiment is described in Part IX. The tenth part of the experiment is described in Part X. The eleventh part of the experiment is described in Part XI. The twelfth part of the experiment is described in Part XII. The thirteenth part of the experiment is described in Part XIII. The fourteenth part of the experiment is described in Part XIV. The fifteenth part of the experiment is described in Part XV. The sixteenth part of the experiment is described in Part XVI. The seventeenth part of the experiment is described in Part XVII. The eighteenth part of the experiment is described in Part XVIII. The nineteenth part of the experiment is described in Part XIX. The twentieth part of the experiment is described in Part XX. The twenty-first part of the experiment is described in Part XXI. The twenty-second part of the experiment is described in Part XXII. The twenty-third part of the experiment is described in Part XXIII. The twenty-fourth part of the experiment is described in Part XXIV. The twenty-fifth part of the experiment is described in Part XXV. The twenty-sixth part of the experiment is described in Part XXVI. The twenty-seventh part of the experiment is described in Part XXVII. The twenty-eighth part of the experiment is described in Part XXVIII. The twenty-ninth part of the experiment is described in Part XXIX. The thirtieth part of the experiment is described in Part XXX.

Part III.

The first part of the experiment is described in Part I. The second part of the experiment is described in Part II. The third part of the experiment is described in Part III. The fourth part of the experiment is described in Part IV. The fifth part of the experiment is described in Part V. The sixth part of the experiment is described in Part VI. The seventh part of the experiment is described in Part VII. The eighth part of the experiment is described in Part VIII. The ninth part of the experiment is described in Part IX. The tenth part of the experiment is described in Part X. The eleventh part of the experiment is described in Part XI. The twelfth part of the experiment is described in Part XII. The thirteenth part of the experiment is described in Part XIII. The fourteenth part of the experiment is described in Part XIV. The fifteenth part of the experiment is described in Part XV. The sixteenth part of the experiment is described in Part XVI. The seventeenth part of the experiment is described in Part XVII. The eighteenth part of the experiment is described in Part XVIII. The nineteenth part of the experiment is described in Part XIX. The twentieth part of the experiment is described in Part XX. The twenty-first part of the experiment is described in Part XXI. The twenty-second part of the experiment is described in Part XXII. The twenty-third part of the experiment is described in Part XXIII. The twenty-fourth part of the experiment is described in Part XXIV. The twenty-fifth part of the experiment is described in Part XXV. The twenty-sixth part of the experiment is described in Part XXVI. The twenty-seventh part of the experiment is described in Part XXVII. The twenty-eighth part of the experiment is described in Part XXVIII. The twenty-ninth part of the experiment is described in Part XXIX. The thirtieth part of the experiment is described in Part XXX.

EXPLANATION

OF THE

PLATES.

PLATE I.

FIGURE 1. A flat trocar.
Fig. 2. A curved grooved director, for introducing a seton or cord along the course of an abscess.

PLATE II.

Fig. 1. A screw tourniquet, described in Volume I. Chapter VII. Every part of this instrument is represented of the full size. It may either be made of brass or steel, and the strap should be of strong unyielding materials, at least an inch broad, and of a length sufficient to pass easily round the largest circumference of any of the extremities.

Fig. 2. A spring fléme, described in Chapter XIII. Section I.

PLATE III.

Figs. 1. and 8. Two forms of a tenaculum, for the purpose of pulling out blood vessels to be tied with ligatures.

Figs. 2. and 4. Two needles, somewhat different in the curve from those in common use: the handles being nearly straight, they are thereby managed with more ease than the others, particularly in deep wounds.

Figs. 3. and 5. Two needles of the usual form, but neither these nor the other two have an edge on their concave parts. They are somewhat round like a lancet, both on their convex and concave sides; which adds to their strength, and makes them enter with more ease than the thick round form of the others.

Figs. 6. and 7. Two straight needles for futures of the intestines, and other delicate parts.

Many instruments have been proposed for holding needles, when employed in deep wounds: the porte-aiguille, represented in Plate IV. fig. 1. answers this purpose as well as any other, but instruments of this kind are seldom needed. All these instruments are represented of a proper size for use.

PLATE IV.

Fig. 1. A Porte-aiguille, mentioned in the explanation of Plate III.

Figs. 2. 3. and 4. Gold pins, used in the twisted future, described in Vol. I. Chapter VI. Section V.

Fig. 6. A gold pin, with a steel point, also used for the twisted future.

Fig. 7. A moveable point of steel, fitted to the gold pin, fig. 8.

Fig. 5. A flat needle, sometimes used in securing blood vessels contiguous to bones.

All these instruments are here of a full size for use.

PLATE V.

Fig. 1. A scarificator with sixteen lancets; the different parts of which are so generally well known, that it is not necessary to describe it.

Fig. 2. A cupping glass, fitted with an exhausting syringe, for the purpose of extracting blood from wounds made by the scarificator, fig. 1.

Figs. 3. and 4. The different parts of fig. 2. represented separately.

Fig. 5. A strong curved needle, with a round, though somewhat sharp point. This instrument answers the purpose better than any other yet proposed for passing ligatures below the artery in the operation for the aneurism, and beneath the spermatic cord in the operation of castration.

PLATE VI.

Figs. 1. and 2. The best forms of lancets for the operation of bloodletting, described in Vol. I. Chapter VIII. Section I.

Fig. 3. represents the broad shouldered lancet in common use, but which, from its form, is evidently ill suited for this nice operation.

Figs. 4. and 5. represent two different forms of scalpels in common use: either of them answer the purpose, but fig. 5. cuts more easily than the other. Fig. 4. proves useful in some of the lesser operations, such as opening the sac in the fistula lachrymalis. This last is of a full size for these purposes; but the larger scalpels should be six inches long, and stronger than they are usually made.

PLATE VII.

Fig. 1. A representation of the trephine of a full size for use.

Fig. 2. Forceps for the purpose of removing detached portions of a fractured skull. They are also used for taking out pieces of the skull that have been separated or cut out by the trephine, when they do not come away in the head of the instrument.

Fig. 3. A head of a trephine with larger teeth than the instrument in common use; and along the course of the saw, there are three vacancies in which the teeth are entirely wanting: by this it is supposed that a piece of bone may be cut out more quickly than with the common trephine, and that the instrument need

not be so frequently removed for the purpose of being cleared of the small fragments of bone produced by the saw: when the teeth of this saw are firm and properly set, it cuts both quickly and smoothly, but not better than the instrument in common use.

PLATE VIII.

Fig. 1. This figure represents the instrument, commonly named a trepan. As the page does not admit of the full size, every part of it is about one-third less than it ought to be. The upper part of the handle is of timber; the rest should all be polished steel.

For reasons that I have given in Chapter X. Vol. II. every operator should be provided with this instrument as well as with the trephine, Plate VII. fig. 1. the same heads being made to fit both instruments.

Fig. 2. This instrument is commonly termed a lenticular. It is used by some for scraping the edges of the opening in the bone formed by the trepan, when they are found to be rough and unequal: for this purpose, it is sharp on one side, and the button on the top is meant to protect the brain, and to receive the pieces that fall from it. There is rarely, however, any cause for using it: I have never found it necessary, but I have given a view of it, as it forms part of the apparatus of every surgeon for the operation of the trepan.

Fig. 3. A raspatory for removing the pericranium, before applying the trepan; but no more of the skull should ever be denuded than is merely necessary for the purpose.

PLATE IX.

Figs. 1. and 2. Two instruments termed probangs, for the purpose of pushing such substances into the stomach as are fixed in the œsophagus. It consists of a piece of soft sponge, firmly tied to a piece of

flexible whalebone, fifteen or sixteen inches in length. The whalebone should be well polished; and in order to render the introduction of it as easy as possible, it should be dipped in fine oil.

Fig. 3. A scarificator, for the purpose of opening abscesses in the fauces, or for scarifying the amygdalæ when inflamed.

Fig. 4. The scarificator covered with a silver canula. A, The handle of the scarificator; B, a screw-nail fitted to the hole in the scarificator; by which the length of the point to be left uncovered at the extremity of the canula C, may be exactly regulated.

PLATE X.

The figures in this plate represent all the parts of the trephine separately.

Fig. 1. The handle of the trephine, which should be made of timber, and of the form here represented.

Fig. 2. The saw or head of the trephine: the upper part of it should fit with much exactness an opening in the under part of the handle, so that when inserted into it the hole *B* may be opposite to the end of the screw *A*, when by turning the screw *A*, the two parts of the instrument may be firmly connected together.

C, the nut of a screw passing through a slit in the handle of the head, and fixed in the upper part of a moveable pin, *D*. In using this instrument, the point of the pin *D* is made to project past the teeth of the saw, till an impression is made upon the skull, of a sufficient depth for retaining it, when the pin should be removed: this is easily done, by moving the nut *C* to the upper part of the slit, and fixing it there by turning the screw. All the parts of the trephine are here also represented of a full size for use: the diameter of the saw should not be less than an inch. Of this size it is used with the same ease as saws of the smallest diameter, and the opening formed by it being larger, it answers the intention of the operator better.

Fig. 3. A head of a small size such as is commonly used: the pin *E* is in this instrument fixed by a screw into the bottom of the head, and is taken out by means of the key, fig. 4. but the method of moving the screw, as represented in fig. 2. is in every respect better.

Fig. 5. A perforator for forming a small hole in the centre of the piece of bone on which the head of the trephine is to be applied, and into which the pins *D*, *E*, figs. 2. and 3. must be inserted. The perforator should be exactly fitted to the handle of the instrument, fig. 1. to which it must be fixed by the screw *A* in the manner directed for fixing the head to it.

PLATE XI.

Figs. 1. and 3. represent the different parts of a levator nearly the same with that of Mr. Petit. Fig. 1. a frame supported by two feet with a pin and moveable ball on the upper part of it: this pin must be of a size corresponding to the holes in the levator, fig. 3. and the ball should move with freedom in every direction, by which the point of the instrument may be carried with ease from one part to another, while the frame on which it is fixed is kept firm in its situation by an assistant.

Fig. 2. The two parts of this instrument joined together, and ready for use.

Fig. 4. The levator in common use; but this instrument, while it elevates one part of the skull, must press with so much force upon another, that it never ought to be used, especially as the levator, fig. 2. answers with perfect safety every purpose for which the other can be employed.

PLATE XII.

Fig. 1. A delineation of some parts of the eye, referred to in different parts of Chapter XI.*

* Vide Descriptionem Anatomicam Oculi, Iconibus illustratam. Auctore Johanne Getfreid, Zinn. M. D.

a, These points represent the openings or orifices of the glands of Meibomius; by which, a viscid glutinous substance, commonly termed the gum of the eyes, is separated and discharged.

d, The caruncula lachrymalis.

c, The membrana semilunaris, which seems to have some effect in directing the tears towards the puncta lachrymalia *b*, from whence they are conveyed by their corresponding ducts into the saccus lachrymalis *e*, and afterwards to the nostril by the nasal duct.

In the cure of the fistula lachrymalis, it is of much importance to be well acquainted with the anatomy of these parts; of which this delineation will convey a more exact idea than could be given by description.

Fig. 2. A sharp pointed instrument, from its figure termed a *hasta*, by which the eye may be fixed in extracting and couching the cataract; but it does not answer the purpose so well as different instruments to be hereafter described.

Fig. 3. A *speculum oculi* in common use, but it does not fix the eye so well or so easily as the *speculum* delineated in Plate XIII. or the instrument, fig. 5. Plate XXII.

Fig. 4. A very useful form of knife for various operations on the eyeball and eyelids, particularly for cutting or scarifying turgid blood vessels on the eye: a lancet is commonly used for this; but this knife is used with more steadiness, and being round or blunt on the back, it does not so readily injure the contiguous parts.

PLATE XIII.

The figures in this plate represent different views of an instrument frequently mentioned in the course of this work. Various forms of a *speculum oculi* have been delineated in books; but they have seldom been used in practice. They have in general been found either to compress the eye too much, so as to induce

pain and inflammation; or not to fix it sufficiently. The instrument here represented, when properly polished, creates little uneasiness, at the same time that the eye may be so compressed with it as to be kept perfectly steady. The handle may be either of steel or timber, but the rest of it should be made of silver or fine polished steel. Operators should be provided with specula of different sizes. The views here delineated are taken from a size that answers for most part of adults.

A well adapted speculum is an useful instrument in many diseases of the eyes, but particularly in the operations of couching and extracting the cataract. Some having imagined, that it may be an advantage to be able to withdraw the speculum while the knife or needle remains in the eye, it has been proposed to leave a vacant space for this purpose in the circle of this instrument, which surrounds the eyeball, as is represented in fig. 3. The speculum should be always kept, however, upon the eye, as long as either the extracting knife or couching needle remains in it, otherwise the eye cannot be rendered sufficiently steady: but to those who are of a different opinion, this form of the instrument delineated in fig. 3. will answer the purpose.

PLATE XIV.

Fig. 1. A bandage for the eyes, usually termed goggles, by which any quantity of light can be admitted that a patient may wish for, while, at the same time, the eyes are sufficiently protected, without being kept too warm, or too closely tied down, as is commonly done with the bandages usually employed. It consists of two pieces of polished timber, excavated into the form of cups, but open at both ends, and corresponding to the size of the eyes for which they are intended: and these being covered with black or green gauze, they are fixed by the riband tied round the head.

Fig. 2. A cup of an oval form, for the purpose of bathing the eyes either with water or any other liquid. Being of an oval form corresponding to the size and figure of the orbit, the eye can be more effectually washed or bathed in any liquid contained in it than in any other manner.

Fig. 3. A bag of resin elastica, fitted with an ivory pipe for the purpose of injecting warm water between the eyelid and ball of the eye, in order to remove sand, lime, or any other extraneous matter that happens to be lodged between them.

Figs. 4. and 5. Pipes of different forms, that may be occasionally fitted to one of these bags.

Fig. 6. A flat hook, either of polished silver or steel, for separating the eyelids from each other. This is commonly done by the fingers of the operator, or by an assistant; but in many of the more minute operations on the eye, this kind of flat hook is employed with much advantage: so that every surgeon in this branch of business should be possessed of it.

PLATE XV.

Fig. 1. A couching needle of the best form that I have seen. It penetrates the eye more readily than the round needle, fig. 2. and the cataract is more easily depressed with it.

Fig. 3. A needle of a flat form, similar to fig. 1. with a small curve near to the point. With this curve I have sometimes found that the cataract is more easily depressed than with a straight needle; but I have not yet used it so frequently as to be able to speak with certainty about it.

Figs. 4. and 5. Two needles for performing the operation of couching, by entering the instrument at the internal angle of the eye, and pushing it out towards the other. By which means the operation may be done upon the right eye with the right hand; whereas, with the common straight needle, the left

hand must be used for the right eye; a degree of steadiness, which some practitioners cannot always attain with the left hand.

All these instruments are delineated of a size fit for use. The handles should be made of light timber, and the steel part of them polished in the most exquisite manner. None of them should exceed forty grains in weight, including that of the handle.

PLATE XVI.

Fig. 1. A form of a knife for the operation of extracting the cataract. It should be tolerably firm, and highly polished. Near the point both sides of the knife should be sharp, by which the cornea is more easily penetrated, but backwards the upper edge of it should be round; which not only gives more strength to the instrument, but makes the risk less of hurting the iris,

Fig. 2. A knife of the same form in the cutting part of it with fig. 1. But by means of the bend, the operation may be performed on the right eye with the right hand of the surgeon.

Fig. 3. A knife commonly used in Germany in extracting the cataract,

Fig. 4. A small scoop for removing either the whole body of the lens, or any part of it, when in extracting the cataract it happens to lodge either in the pupil or anterior chamber of the eye, between the iris and transparent cornea,

PLATE XVII.

Fig. 1. A delineation of the eye with the couching needle inserted into it.

Fig. 2. The knife employed for dividing the cornea in extracting the cataract, is here inserted across the eye, between the cornea and iris. And in fig. 4. the cut is delineated which ought to be formed in the

cornea in the usual method of performing this operation. Fig. 3. represents the cornea divided in the superior part of it, in the manner I have mentioned in describing the method of extracting the cataract.

PLATE XVIII.

Fig. 1. A view of the right eye with one of the curved needles of Plate XV. inserted into it ; by which it is evident that a cataract may be couched in the right eye with the right hand of the surgeon.

Fig. 6. Represents a curved knife inserted beneath the cornea in the operation of extracting the cataract with the right hand from the right eye.

Fig. 2. A sharp curved probe for removing the cataract, by making an opening behind the iris, in the manner I have advised in the Chapter on that operation.

Fig. 4. Small forceps, which may occasionally be employed for the same purpose.

Fig. 5. A flat curved probe, either of gold or silver, for inserting through the pupil, in order to tear or form an opening in the capsule of the lens, so as to admit of an easy expulsion of the cataract.

Fig. 3. A tube of steel, with an edge sufficiently sharp for penetrating a hard bone, by which a portion of the os unguis, corresponding to the size of the tube, may be removed, when in the operation for the fistula lachrymalis this may be judged proper.

PLATE XIX.

Fig. 1. An instrument for the purpose of compressing the lachrymal sac. *AA*, a curved plate of steel covered with flannel or silk, and adapted to the forehead, upon which it is fixed by the ribands *CC*. *B*, Another plate of steel connected to the former ; which passing back towards the occiput, serves to fix the machine with more certainty by means of the riband

C at its extremity. *D*, a small moveable bar of steel, passing through an opening in the plate *AA*, to be firmly fixed at any particular height by the screw *F*. *G*, a small cushion or button of steel covered with silk or soft flannel; which being placed upon the corner of the eye immediately above the lachrymal sac, any necessary degree of pressure may be applied by means of the screw *H*. The moveable bar *D* is separated into two pieces by a screw at *E*; so that by turning this screw, the cushion *G* may be turned more or less outward at pleasure, according to the particular form of the part on which it is to be applied.

The instrument here delineated is intended for the left eye; but it is easily made to answer the right eye, by moving the bar *D* into the slit or opening on the opposite side of the plate *AA*.

Fig. 2. A trocar and canula, for perforating the os unguis in the operation for the fistula lachrymalis.

Fig. 3. The stilette; and, fig. 4. the canula, represented separately.

Fig. 5. A curved trocar; the instrument commonly employed for the fistula lachrymalis; but the straight trocar, fig. 2. answers better.

PLATE XX.

Fig. 1. A silver syringe, for the purpose of throwing liquids into the lachrymal passages. Fig. 4. A curved tube, adapted to the syringe, and of a proper size for being inserted by the nostril into the extremity of the nasal duct of the lachrymal sac. Fig. 5. A small tube, of a size corresponding to the lachrymal puncta, for throwing injections through these openings into the sac. Figures 6. and 7. Tubes of a larger size, for throwing liquids through the sac into the nose by an external opening, when this has either been made by an incision, or when the sac has burst, in consequence of tears and matter collecting in it.

Figs. 2. 3. 8. 9. 10. and 11. Tubes of different forms, which have been employed in operating for the fistula lachrymalis, when the passage through the os unguis cannot in any other manner be kept free and pervious. Of these, however, figs. 3. and 10. are the best. The small bulge with which they are formed, not only prevents them from passing through the opening altogether into the nose, which cylindrical tubes are apt to do, but when they are once properly fixed, it prevents them from rising against the skin, which they are otherwise ready to do. The tubes here represented, are of fizes, both as to length and thickness, which answer for the most part of adults; but these are circumstances which must depend upon the nature of every case, and will accordingly be liable to some variety. Tubes for this purpose should be made of gold, polished in the finest manner.

PLATE XXI.

Fig. 1. A curved scalpel, employed by some practitioners for extirpating the eyeball. By its form it is supposed to be well suited for this purpose; but the common straight scalpel I have repeatedly found to answer better.

Figs. 2. 3. and 4. Curved probes, of a proper size for inserting by the nostril into the nasal duct of the lachrymal sac, by those who wish to clear these passages in this manner.

Figs. 5. and 6. Probes of a smaller size, for inserting into the lachrymal puncta.

PLATE XXII.

Fig. 1. The knife commonly used by Mr. Pellier in extracting the cataract. It should be highly polished, and so sharp as to penetrate the eye with ease, at the same time that it should be sufficiently strong for dividing the cornea without yielding. This, as

well as the other two knives in this plate, are made to fit the handle represented in Plate XXIII. fig. 1.

Fig. 2. A knife exactly of the same form and size with the other; only in this, that side which passes next the iris is round or convex, with a view to protect that membrane from being injured, which it is apt to be when the common flat knife is employed in eyes that are not prominent.

Fig. 3. A probe pointed knife, which in some cases may be employed with advantage for finishing the operation, when by any accident the aqueous humour escapes before the point of the other knife has pierced the opposite side of the cornea: but for a more particular account of the method of using it, I must refer to what has been said in describing the different steps of the operation.

Fig. 4. Curved scissars of a proper size for every operation on the eyes where scissars are needed: indeed every practitioner who operates on the eyes should have them.

Fig. 5. This is the only speculum which Mr. Pellier employs. It may be made of gold or silver wire, or of any other metal. It is here represented of a full size for adults, both in length and thickness of wire. In using it, one of the curves is placed upon the upper eyelid, directly behind the cartilaginous border; and being given to an assistant, a degree of force is applied with it sufficient for fixing the eye; which is easily done, if the operator at the same time makes some resistance, by placing the index and middle fingers of one hand on the under edge of the orbit, so as to compress the eye beneath.

All the instruments of this plate are represented of the full size.

PLATE XXIII.

Fig. 1. A knife used by Mr. Pellier in some cases for extracting the cataract. It is fixed in the handle

at B by a male screw, fitted to a female screw, which is turned by the nut A. This handle may be made to answer figures 4. and 5. as well as every knife employed in operations of the eyes.

Fig. 2. An instrument for depressing the under eyelid. When an assistant cannot be procured, it may often prove useful. The two flat hooks at the upper end of it being fixed on the cartilaginous edge of the eyelid, the other end of it hanging over the cheek, by its weight draws it down.

Fig. 3. An instrument for determining the quantity of skin to be removed in operating for the trichiasis or inversion of the eyelids. When it is found necessary to remove a portion of skin from beneath the under eyelid, or from the superior part of the upper palpebra, it may be done with a common scalpel, while an assistant supports it from the parts beneath either with his fingers alone or with forceps made for the purpose; but this instrument answers better, as by means of it the quantity of parts to be removed can be ascertained, and cut off with more precision.

Fig. 4. A knife for opening small collections of matter on any part of the eyeball. Being blunt on the back, and round on the end, it is used without any risk of injuring the contiguous parts.

Fig. 5. A sharp pointed curved knife for dividing the vessels of the eye or of the palpebræ.

These instruments are all delineated of the full size.

PLATE XXIV.

Fig. 1. A curved needle fixed in a handle, for passing ligatures beneath the pterygium and other small excrescences sometimes met with on the external surface of the eyelids, and not unfrequently on the eye itself. Fig. 1. is intended for tumors on the right eye, and to be used with the left hand of the surgeon.

Fig. 4. is for the left eye, to be used with the right hand.

Figs. 2. and 3. An instrument termed a cistatome, being meant for opening the capsule of the crystalline lens. It may be made of gold or any other metal. It is held between the thumb and fore and middle fingers of the right hand, care being taken to place the thumb upon the button *A* or *C*, which is connected with a sheath that covers the sharp point *B*. The hand being supported on the cheek by the ring finger and little finger, the point of the instrument covered with the sheath must be cautiously passed through the pupil till it reaches the lens; when the button *C* being drawn back with the thumb, the point of the instrument is thus set at liberty, without the hand being moved. This is an ingenious invention, and answers the purpose with ease and safety.

These instruments are all represented of the full size.

PLATE XXV.

Fig. 1. A small scoop, which answers better than any other instrument for removing small stones, peas, and such like substances, from the nostrils or ears.

Figs. 2. 3. 4. 5. and 6. Are instruments employed by Mr. Pellier for the operation of the fistula lachrymalis. Fig. 2. is a perforator and conductor for clearing the passage through the os unguis into the nose. Figs. 5. and 6. are tubes for leaving in the passage. Fig. 3. is a compressor for fixing them after they are inserted; and the easiest method of inserting a tube is by putting it upon the conductor after it is passed through the compressor, as is represented in fig. 4. The conductor, armed with the tube and compressor, being passed through the passage into the nose, must be withdrawn; when, by means of the compressor, the tube may be firmly fixed.

These instruments are all represented of the full size.

PLATE XXVI.

Fig. 1. Forceps of a convenient form for extracting small bones or other substances from the throat.

Fig. 2. An instrument for preventing the nostrils from collapsing after the operation described in Vol. II. Chap. XII. Sect. IV. A B, Two moveable tubes for inserting into the nostrils, to be retained in their situation by a riband passed through the opening CD, and tied on the back part of the head.

Fig. 3. A side view of one of the tubes.

These instruments are all represented of the full size. They, as well as some others in this volume, are taken from some elegant engravings published by Mr. Bambrilla of Vienna.

Fig. 4. A tube for the purpose of conveying a waxed ligature through one of the nostrils into the fauces, when the ligature being drawn out at the mouth, a cushion or pad is attached to it, when it is drawn forcibly into the back part of the nose, for the purpose of putting a stop to hemorrhagies from the nostrils that do not yield in any other manner. See Vol. II. Chap. XII. Sect. II.

PLATE XXVII.

The figures in this plate represent instruments of Mr. Wathen's for the cure of the fistula lachrymalis.

Figs. 2. and 3. A tube and tent for inserting into the natural passage between the lachrymal sac and the nose: these instruments may either be of lead, silver, or gold: when of silver or gold, it is necessary to have one or two turns of a female screw in the top of the cup or cylinder; but not when formed of lead.

Fig. 4. The stile of the tube.

Fig. 5. The stile of the tent.

The stiles are meant to conduct their corresponding tubes and tents into the passage. And,

Fig. 1. A screw stile for the purpose of removing the tubes or tents when necessary, for which purpose, however, small forceps answer better.

Figs. 6. and 7. A tube and tent with a string fixed to an aperture at the top of each.

Figs. 8. and 9. A tube and tent with a stile and string united to each, and ready for use.

These tubes and tents, Mr. Wathen observes, are of the largest scale: there are two inferior screws; the middlemost of which proves most generally applicable.

I have thus given a delineation of this part of Mr. Wathen's apparatus, with which I doubt not that the fistula lachrymalis may be cured; but I consider it in every part as inferior to what I have delineated in Plate XXV. both for the form of tubes and method of introducing them. For a more particular detail, however, than can be given here of the method of using Mr. Wathen's apparatus, his book should be consulted; in which many valuable observations will be met with.*

PLATE XXVIII.

Fig. 1. Mr. Berenger's knife for the operation of extracting the cataract.

Fig. 3. Baron Wensel's knife.

Fig. 4. Dr. Richter's knife.

Fig. 2. A speculum oculi, the invention of my friend Dr. Wardrop, whose experience in diseases of the eyes has been very extensive.

This speculum will be found very useful when the operator cannot have the aid of a good assistant. In scarifying the vessels of the eye, this instrument answers the purpose of holding back the eyelids completely, and gives a sufficient degree of steadiness to the ball of the eye. The inside of the eyelids are also

* Vide A New and Easy Method of curing the Fistula Lachrymalis; the second edition, &c. By Jonathan Wathen Phipps, surgeon, London.

turned outwards, at the same time that they are pushed backwards, so as to expose the parts in the most complete manner.

The hinge should be made very easy, that the operator may have little resistance to overcome, and thus he will be more sensible of the degree of pressure to be made upon the eye. The other parts must be so firm as not to yield to any force that may be employed. The points of the forceps are connected with the semicircular pieces obliquely, to prevent the hand that holds the instrument from obstructing the light.

These semicircular parts should be covered with thin leather that has some degree of roughness.

In using the instrument, it should be placed shut upon the eyelids, and gradually opened as the eyelids are pushed backwards: thereafter as much pressure is to be made as may be found necessary.

Fig. 5. Small forceps, used by Baron Wensel, for taking out the capsule of the lens, when in the operation of extracting the cataract it is found to be opaque.

PLATES XXIX. and XXX.

The figures in these plates form a very useful part of the apparatus of an oculist. It is employed by Mr. Bischoff.*

All the figures of Plate XXIX. represent a chair on which the patient is placed during the operation of extracting the cataract, by which his head is kept much more fixed and steady than it can possibly be in the usual way, supported on the breast of an assistant; and as steadiness is of the greatest importance in all operations on the eye, the use of this chair may be extended to many others.

* For a more particular account of this apparatus, see a Treatise on the Extraction of the Cataract, by Frederick Bischoff, F. M. S. Oculist to his Majesty in the Electorate of Hanover, and to her Majesty in England.

Figs. 1. and 2. Represent a strong made chair, to which is fastened a back A, which on each side by means of a screw B, moves backwards and forwards. In the top D, which can at C, if necessary, be turned back, is a concave cloth cushion for the greater security of the head, and to prevent it from slipping: being made of a height to admit of the operator standing, there are different pieces of wood, Plate XXX. fig. 1. to put under the cushion, fig. 2. each of these pieces of wood have two pegs E F, which fit corresponding holes in the seat of the chair: the cushion, fig. 2. Plate XXX. is made in a wooden frame, to which is fixed two projecting pieces of iron, which go through the holes E F in the chair, fig. 2. Plate XXIX. and fasten at the back, in the back part of the chair with an iron peg, fig. 3. HH.

In fig. 3. Are two bars I I, to support the top: K is a stand to prevent the top from falling, received into the notches L, which enable the operator, by their different distances, to incline the moveable top more or less backwards as he may find convenient.

Fig. 3. Plate XXX. represents a very useful bandage for different operations on the eyes, particularly for the after treatment of the operation for the cataract. It consists of a double piece of linen AA, about three fingers broad, and proportioned in length to the circumference of the head: at each end are fixed two strings BB to tie it on the forehead: to this piece of linen are sewed two pieces of double, dark coloured silk or linen, CC, about six fingers square, so that the piece which covered the diseased eye should be a little under the other piece, that no light may possibly reach the eye on which the operation has been performed; while some degree of light, if the operator thinks proper, may be admitted to the other.

Fig. 4. is a knife for extracting the cataract, nearly the same, although somewhat different from Dr. Rich-ter's, Plate XXVIII. fig. 4.

PLATE XXXI.

Fig. 1. A double canula for fixing ligatures upon polypous excrescences either in the nose, throat, ears, or vagina. The ligature may either be of catgut or pliable silver wire.

Figure 4. Another canula for the same purpose. When the other is used, the ligature is tied round the handles of the instrument. In this the ligature passes through a moveable handle, and is easily turned to any degree of tightness.

Fig. 2. Is a canula of the same kind with the others; but being crooked, it is better calculated for removing polypi deeply seated in the throat. The method of using these instruments is described in different parts of Chap. XII. Sect. V.

Fig. 3. Is an instrument for passing a ligature over the uvula. A thread being passed through the tubular part of the handle with the probe A, a noose is then formed on it; and being lodged in the groove on the inside of the ring, the other end of the thread is passed through the two small holes on the outsides of the ring; and thus it is ready for use. This is commonly termed the ring of Hildanus, from the name of its inventor. All these instruments are represented of the full size.

PLATE XXXII.

Fig. 1. A section of the bones of the head, representing a polypus in the throat hanging down behind the velum pendulum palati, with a ligature passed over it and fixed at the root of it, with a double canula inserted through one of the nostrils.

Fig. 2. This figure is taken from Mr. Cheselden. It represents a polypus in the nose, with part of it passing back to the throat, and the rest into the nostril, with a ligature inserted from the nostril into the

throat, in such a manner as to include the root of the excrescence in its doubling. By afterwards twisting the ends of the ligature, a degree of compression may be applied upon the root of the polypus sufficient for making it drop off; but it would not answer in every case; and as the method with the canula, Plate XXXI. is not only more easy but more effectual, the other will never probably be used.

PLATE XXXIII.

Fig. 1. A polypus of such a size that it filled the nostril completely, and was removed with a ligature as is here represented. A, The extremity of the polypus which appeared without the nostril. C, A probe of silver or any other metal, split at the end, in such a manner as to retain a piece of catgut or silver wire; the doubling of which being inserted into the slit, should be pushed up to the root of the polypus on one side, while the tube B being passed upon the two ends of it, must be pushed up to the root of it on the opposite side, when the ligature may be easily drawn to any necessary degree of tightness.

Fig. 3. A slit curved probe, which may be used for the same purpose, namely, for applying a ligature to the root of a polypus in tumors seated in the throat. By this simple invention a ligature may be carried to the throat of almost every polypus that can occur.

PLATE XXXIV.

Fig. 1. An instrument for applying caustic to any part of the mouth or throat. It may be made of silver or any other metal. A, a moveable tube in which the caustic is fixed, when by pulling the ring at the other end, it must be drawn so far into the surrounding canula as to be completely covered with it; when the end of the instrument being applied upon the part

affected, the caustic must be again pushed forward to a proper length, which may be always ascertained with accuracy by means of the small pin tied by a thread to the ring at the opposite end of it. This, as well as the instruments of Plate XXXIII. I am favoured with by Dr. Monro, whose improvements in surgery are numerous and important.

Figs. 2. 3. and 4. are different parts of an instrument mentioned in Section V. Chapter XII. Vol. II. for the purpose of putting a ligature round a polypus in the throat.

Fig. 2. A waxed thread with a noose adapted to the size of the groove in the ring C D, fig. 3. E D, E C, Two tubular pieces of brass, each of which is two inches and a half long, supporting the ring which is placed horizontally upon them. At the upper ends of each they should be made perfectly smooth and round, so as to allow the thread to slide easily, and to prevent it from being cut by the edges of the tubes. C D, The apertures where the ends of the thread are inserted. E, One of the openings at which they are brought out. The other opening cannot be seen in this view of the instrument. The handle of the instrument is of strong wire, seven or eight inches long, and bent a little that it may be the more easily introduced.

Fig. 4. An instrument for making a second noose. F, Two brass wheels fixed in a small case of brass. The two wheels are five-eighths of an inch broad, and half an inch deep. After forming a second noose, the ends of the thread should be passed over the wheels in the manner here represented, when the handle of the instrument being pushed upwards, a knot may be formed of any degree of tightness.

This instrument is evidently formed upon the same principle with the ring of Hildanus, Plate XXXI. fig. 3. and was the invention, I believe, of the late ingenious Mr. Dallas, surgeon in Musselburgh.

PLATE XXXV.

Fig. 1. Curved forceps for extracting polypi from the throat, and from behind the velum pendulum palati.

Fig. 2. Straight forceps for extracting polypi from the nostrils.

Fig. 3. Forceps for the same purpose with the last, but somewhat different in form. The method of using both these and the others, is described in Sect. V. Chap. XII. Vol. II.

PLATE XXXVI.

Figs. 1. 2. and 3. Different forms of curved scissars, for extirpating tumors within the mouth, as well as for other purposes.

Figure 4. An instrument nearly of the form of a flemme, which answers better than any other for scaring the gums of children in dentition.

PLATE XXXVII.

Fig. 1. A scarificator for separating the gums from the roots of teeth intended to be extracted: it should be very sharp, but at the same time not so fine in the point or edge as to be hurt by being insinuated between the gums and the teeth.

Fig. 2. A curved trocar for perforating the antrum maxillare.

Figs. 3, and 4. Two dissecting hooks with two and three prongs, which answer better for many purposes than the single pronged hook in common use.

PLATE XXXVIII.

Fig. 1. An instrument for passing a ligature round the uvula or any other pendulous excrescence in the

throat; but although the proposal is ingenious, it does not answer the purpose so well as the instruments delineated in Plate XXXI. figs. 1, 2, 3, and 4.

Fig. 2. An instrument first proposed by Mr. Cheselden for tying a knot upon scirrhus amygdalæ after passing a ligature through the basis of the tumor, in the manner represented in fig. 3. The pin in fig. 2. is meant to represent a part upon which a knot is to be formed.

PLATE XXXIX.

Fig. 1. An instrument for removing the uvula by excision. That part of the uvula intended to be removed being passed through the opening in the body of the instrument, the cutting slider, which ought to be very sharp, must be pressed forward with sufficient firmness for dividing it from the parts above.

Fig. 3. A curved probe pointed bistoury, for removing small tumors in the throat or any part of the mouth; and fig. 2. forceps for laying hold of tumors intended to be removed in this manner.

PLATE XL.

Figs. 1, and 3. Two scarificators of different forms for opening abscesses in the throat, and for scarifying the amygdalæ. The two wings with which the canula of fig. 1. is furnished, are intended for compressing the tongue, while the point of the instrument is passed more deeply into the throat.

Figs. 2, and 4. Mr. Mudge's machine for conveying steams of warm water and other liquids to the throat and breast. Fig. 2. The inhaler as it appears when fitted for use, except that the grating A, which then ought to cover the hole, is now turned back, to shew the opening into the valve. Fig. 4. A section of the cover, in which is shewn the construction of the cork valve B, and also the conical part C, into which the flexible tube D is fixed.

When the inhaler, which holds about a pint, after being three parts filled with hot water, is fixed at the armpit under the bedclothes, the end of the tube E is to be applied to the mouth; the air, in the act of respiration, then rushes into the apertures F, and passing through the hollow handle, and afterwards into a hole in the lower part, where it is foldered to the body, and therefore cannot be represented, it rises through the hot water, and is received into the lungs, impregnated with vapour. In expiration, the contents of the lungs are discharged upon the surface of the water; and instead of forcing the water back through the hollow handle, the air escapes by lifting the round light cork valve B, so as to settle upon the surface of the body under the bedclothes.

Thus the whole act of respiration is performed, without removing the instrument from the mouth.

The flexible part of the tube D is about six inches long, fitted with a wooden mouth piece E at one end, and a part G of the same materials at the other, to be received into the cone C on the cover. This flexible tube is made by winding a long slip of silk oil skin over a spiral brass wire; which is then covered with one of the same size, of thin silk, and both secured by strong sewing silk wound spirally round them. Some length and degree of flexibility is necessary to this tube, for the sake of convenient accommodation to the mouth when the head is laid on the pillow.

Care should be taken to make the cover fit very exactly; otherwise the defect should be remedied by winding a piece of cotton wick, or some such contrivance, round the rim beneath the cover, so as to make it air tight. The cork, likewise, which forms the valve, should, for the same reason be made as round as possible. It is also necessary to remark, that the area of the holes on the upper part of the handle taken together; the size of the hole in the lower part of the handle which opens into the inhaler; the opening of the conical valve itself; and that in the mouth

piece ; as well as the cavity or inside of the flexible tube, should be all equally large, and of such dimensions, as to equal the size of both nostrils taken together ; in short, they should be severally so large as not only not to obstruct each other, but that respiration may be performed through them with no more labour than is exerted in ordinary breathing.

PLATE XLI.

Fig. 1. A speculum oris, which I proposed a considerable time ago, and which in different cases has been used with advantage. By occupying less space in the mouth than the instruments in common use, it may be employed where they are inadmissible. B, a handle of timber, through which the screw A C is passed, by which the plate of iron D may be more or less separated from the fixed plate E, by turning the nut A. The plates D E should be sufficiently firm for resisting the pressure of the jaws, and covered with leather or cloth to prevent the teeth from being injured.

Fig. 2. Another form of a speculum for the mouth. G H, Two firm iron plates, which being inserted between the teeth of the upper and under jaws, may be separated to any necessary degree by turning the handle F. The farther extremity of the plate G is intended to compress the tongue, an addition which may be easily made to fig. 1.

Fig. 3. The instrument in common use as a speculum oris ; but it is so defective that it can seldom be used with advantage.

PLATE XLII.

Fig. 1. A kind of cutting forceps, the invention of the late Dr. John Aitken : they may be employed either in the hare lip, or for the removal of cancer of the lip : one blade of the forceps is a plane smooth surface, while the other is furnished with a sharp cut-

ting edge. In using this instrument the two blades must be pressed against each other with one hand with a force sufficient to divide the parts that are meant to be cut; while the other hand is employed in securing the handles.

Figs. 2. and 3. Forceps, for laying hold of the lip in performing the operation for the hare lip, or in removing cancers of the lip, by which the parts are more securely fixed, and may be more neatly cut than when held with the fingers only.

In fig. 2. the blades are both lined with timber, and the blade A A being considerably broader than the other, the lip may be divided by cutting directly down upon it, and carrying the scalpel in close contact with the side of the opposite blade.

PLATE XLIII.

Fig. 1. Scissors of a sufficient size and strength for dividing the parts in the operation for the hare lip.

Fig. 2. Cutting pliers for the purpose of removing small splinters of bone wherever they are met with, particularly in the amputation of limbs.

PLATE XLIV.

As the cure of the hare lip is a point of much importance, I have judged it proper to delineate the appearance of the disease, together with that of the parts in which it is seated during the different stages of the operation and cure.

Fig. 1. A hare lip, in its most common form. A, One of the incisores appearing in the centre of the opening, which ought to be removed before the operation, as a tooth in this situation is very apt to interrupt the cure. B B, The unequal edges of the fissure with which hare lip is very commonly attended.

Fig. 2. The appearance of the parts after the edges of the fissure have been removed and the pins intro-

duced. C C, The edges of the cut, which ought to be smooth, equal, and exactly of the same length on each side, so that when drawn together no inequality may take place. The first pin should be inserted near to the under part of the lip, and the upper pin near to the superior point of the fissure. The pins represented in this figure are furnished with moveable steel points, so that the points may be taken away on the ligatures being applied, as is done in fig. 3. which exhibits the appearance of a hare lip immediately after the operation.

Fig. 4. A lip after the cure is finished. D, Represents the appearance of the cicatrix, which in general should be nearly a straight line.

Fig. 5. A flat pin for the operation of the hare lip. The pin itself, fig. 6. should be of gold, and the point, fig. 7, of steel.

PLATE XLV.

Figs. 1, 2, 3, 4, and 5. Different forms of scaling instruments for removing tartar and other extraneous matter from the teeth.

Figs. 6. and 7. Instruments that may be employed either for burning the nerve of a tooth, or for stuffing a hollow tooth with gold or lead. Fig. 8. may likewise be employed for the same purpose, but it is more frequently used for searching behind and between the teeth, when there is any suspicion of a latent caries that is not readily discovered.

Fig. 9. Another instrument for stuffing carious teeth. And,

Fig. 10. A handle to which all these instruments may be fitted.

PLATE XLVI.

Fig. 1. The instrument commonly termed a key for extracting teeth. After many alterations being made in it, the one here delineated is the best I have ever used.

In fig. 2. the instrument in common use, the claw is fixed, and can only be moved by taking out the screw by which it is connected with the instrument; but in fig. 1. the claw can be moved from one side to another, merely by pressing upon the nut A, by which the spring B is raised out of a niche in a wheel which is thus rendered moveable, and in which the claw is fixed. C, The heel of the instrument which is here represented not only of a greater depth, but considerably longer than usual: of this length it is applied to a considerable extent of gums, by which the jaw is not so apt to be injured as when the heel is much shorter; and of this depth it acts with more power than when of the usual form. This part of the instrument should not only be well polished, but thickly covered with several plies of soft old linen in order to render the pressure produced by it upon the gums as easy as possible. The handle E is sometimes made of iron; but it answers better either of ivory or timber.

Fig. 3. A claw bent in such a manner, that when the heel of the instrument C is placed upon any part of the gums, the second or third tooth farther in the mouth, may be pulled with it. This proves sometimes useful, where the gums opposite to the affected tooth are particularly tender; and it should always be employed when it is meant to pull either of the two farthest molars of the lower jaw outwards; for in using the common instrument for these teeth, the gums that cover the projecting part of the coronoid process of the jaw are always much lacerated.

Figs. 4. and 5. Two claws of different sizes of the ordinary form.

PLATE XLVII.

Figs. 1. and 3. Two instruments much employed in different parts of Europe for extracting teeth. They do not, however, possess any advantage over the key instrument; and they are liable to this objection, that

they cannot be used where a tooth must be turned towards the inside of the mouth.

Fig. 1. A, The fulcrum, which ought to be well covered with soft old linen or cotton: B, the claw fixed to the handle D, by a small hole in the end of it, which receives a knob of a corresponding size, at C, and is retained in its situation by a moveable plate of polished iron D. The handle should be wood, and all the rest of the instrument iron or steel. Fig. 2. A claw with a considerable degree of curvature, for extracting teeth at a greater depth in the mouth than the fulcrum can be placed at.

Fig. 3. F, The fulcrum. E, A straight claw fixed to the instrument by a screw at H. I, The handle, which should be of wood.

PLATE XLVIII.

Figs. 1. 3. and 4. Different forms of forceps for extracting teeth. Fig. 3. is the most useful of any that I have seen.

Fig. 2. Small dissecting forceps employed in different operations in the mouth, as well as in other parts.

PLATE XLIX.

Fig. 1. Teeth forceps with moveable claws, A. And,

Fig. 2. A fulcrum to be used along with the forceps, fig. 1. both described in Vol. II. p. 426.

Fig. 3. An instrument for dividing the frænum linguæ.

PLATE L.

Figs. 1, 2, and 3. Different forms of a punch or lever for extracting stumps of teeth. Figs. 1. and 3. are the best. They consist of two parallel plates of

polished iron, which may be separated more or less by pressing the moveable sliders A B higher or lower.

Figs. 4, 5, 6, and 7. Different forms of files for removing inequalities upon teeth. Some of these should have one side entirely smooth, so that in acting upon a diseased tooth, the contiguous sound tooth may not be injured.

PLATE LI.

All the figures of this Plate represent the edges of wounds, drawn together and retained by adhesive plasters; for an account of which see Volume I. Chapter III. Section II. when treating of the cure of simple incised wounds.

PLATE LII.

Figs. 1, 2, and 3. Different forms of instruments employed for concentrating sound in cases of deafness.

Fig. 4. A syringe of a proper size for washing the meatus auditorius.

Figs. 5. and 6. Instruments for perforating the lobes of the ear.

PLATE LIII.

All the figures in this plate represent glasses for drawing milk from the breasts of women. With figs. 1. and 3. the breast may either be sucked by the person herself, or by an assistant; and fig. 2. is a glass cup, mounted with a bag of elastic gum. A, The glass cup joined to the bag C by the intervention of a brass tube B.

PLATE LIV.

Fig. 1. An instrument for supporting the head after the operation for the wry neck. A B C, A curv-

ed plate of iron, covered with soft leather and properly stuffed, fitted to the shoulder, and supporting another plate, to the top of which is connected the plate D E F, upon which the head is meant to rest, and which should also be covered with soft leather or cotton. G H I, A buckle and strap for fixing the instrument round the neck.

Figs. 2, 3, and 4. Different kinds of cups, which may be either of ivory, lead or silver, for covering and protecting the nipples, when they are either chopped or otherwise diseased. The holes in their brims are for receiving pieces of small tape for fixing them round the body.

Fig. 5. A broad flat needle, of a lancet form for introducing cords or setons in different parts of the body.

PLATE LV.

Fig. 1. A very ingenious improvement of the key instrument by Mr. Robert Clarke, surgeon in Sunderland. The points in which this instrument chiefly differs from the key in common use, are the manner in which it is connected with the handle A B, the form of the claw C, and of the fulcrum or rest F, and the bend in the shank at D E, by which in drawing teeth inwards, the foreteeth are more certainly avoided than can be done with the common instrument.

This instrument is also so contrived that the claw can be quickly changed or turned to an opposite direction, by means of a sliding bolt passing through the claw, instead of a screw: but for a more particular account of it, see *Medical Facts and Observations*, London, Vol. VI. Art. VIII. by which Mr. Clarke seems to have made some alterations in the form of the instrument; the one that he there describes being somewhat different from that which the cutlers here have made of it.

Fig. 2. Is an instrument, from which, in particular circumstances of incontinence of urine, much advantage may be derived. It was worn by a Dutchman who presented himself at this place three winters ago, with a singular and curious conformation of part of the organs of urine and generation, of which an account has already been published.

A B C, The body of the instrument so constructed as to be exactly adapted to the parts on which it is applied: this, as well as all the rest of the machine, should be made of silver, with the edges properly stuffed with leather, flannel, or cotton, for protecting the skin on which it rests, and which is easily done by means of a number of small holes round the whole of it at C. It is fixed to a circular belt round the loins by two pieces of tape, one at the opening A, and another on the opposite side of the instrument, which in this view of it cannot be seen, and at E there is another piece of tape which goes between the legs, and fixes it to the circular belt behind.

This instrument proves particularly useful to all who are distressed with incontinence of urine, accompanied with fistulous openings in the scrotum or contiguous parts that communicate with the urethra, and it is even easily adapted to these parts, so as to cover entirely the scrotum and penis, by which it may be employed with advantage in every variety of the disease.

When urine passes either from the penis, or from fistulous openings that communicate directly with the bladder, it runs down to D, the entrance into the receptacle E F, which contains several ounces, and from whence the urine cannot again return, but passes out at the outlet G, as often as the patient finds it convenient to remove a well adapted cork with which the opening G should be furnished.

PLATE LVI.

In this plate is represented what I consider as an important improvement on the apparatus for perforat-

ing the bladder above the pubes, an operation of much moment, in so far as it is never performed but in cases of great danger, and although easily done, is apt to induce such a number of distressful consequences, as nothing but a continued course of attention, combined with much experience, and many opportunities of performing the operation, can tend to obviate.

By experience I have found, that the common trocar does not answer so well for this operation, as one of a larger diameter, and one of a round form answers better than a flat one, for a large round one does not so readily injure the bladder.

Fig. 1. A trocar of a proper size, both in length and diameter. A A, a moveable cape or shield, fixed on the canula B by means of a screw, and from which it can at any time be easily removed. The slits and holes in the cape, as may be more particularly seen in the front view of it, fig. 5. serve to attach pieces of tape, for the purpose of fixing the canula to a circular belt previously fixed round the loins; as it is a point of much importance in this operation, to have the canula kept steadily in its place, I have sometimes done it by fixing adhesive plasters to the cape of the canula, and applying the plasters firmly upon the contiguous parts: with some, this has answered better than bandages, but others have preferred the tapes attached to a circular belt. In one case, where it answered remarkably well, the cape of the canula was sewed to the circular band, by passing the threads through the few small round holes, and the canula, as well as the belt, was prevented from moving either upwards or downwards, by two double pieces of tape, attached to the canula at the long slits, two passing over the shoulders were carried backwards and fixed to the circular band behind, while the other two being carried downwards, one on each side of the scrotum was also fixed to it behind. In this manner, after various methods had been tried in vain, the canula was easily kept in its situation.

The next object of importance, is to prevent the back part of the bladder from being hurt by the friction of the canula: this we endeavour to do by using a trocar that will not probably reach so far; but even with this in view, the sharp edges of the canula are apt to hurt the bladder. It is however effectually prevented by the addition of fig. 3, a firm silver wire with a round button or stopper of silver E, which removes the sharp edges of the canula, as is seen at C, fig. 2. If E is exactly adapted to the canula, no urine gets into it, by which no calculous incrustation forms in it, as is apt to happen where this precaution is omitted. D being a plug of common cork, the stopper is thereby prevented from falling out.

The patient should be warned to remove the stopper frequently, and to empty the bladder; for where this is neglected, the urine necessarily escapes between the bladder and canula.

It is scarcely necessary to remark, that the canula must in every instance be worn till the urine flows freely off by the urethra. In a great proportion of cases this happens in the course of a short time, but in some not till many months have elapsed. During the inflammatory state of the disease, the bladder commonly forms such adhesions to the contiguous parts, that after the canula has remained long inserted, we might in various instances, withdraw it for the purpose of clearing away any incrustations that form in it, as in a great proportion of cases, it could be easily inserted again: but as these adhesions do not always happen, and as much danger would occur from our not being able to replace the canula, it ought never to be withdrawn till another canula is inserted, which is easily done in the following manner:

Let a canula be provided, somewhat more than double the length of the other, and of a size that admits of its passage easily through it: this canula must consist of two pieces screwed together, as is represented at F, fig. 4. The shortest piece being exactly the

length of the canula of the trocar, being all passed into it, the canula of the trocar is then to be withdrawn, by pulling it along the whole length of the tube : after clearing the canula of the trocar, an attempt may be immediately made to replace it, by pushing it along the tube into the bladder ; and in such attempts we commonly succeed : but we derive a very important advantage from having the long tube previously inserted, as the patient remains in security in the event of our not being able to pass the other again into the bladder, as in some instances has been the case : in this case, a cape or shield, with an opening fitted to the diameter of the small tube, must be fixed upon it at the screw H, when by undoing the connection of the two parts of the tube at the screw F, a canula is left exactly of the same length with that of the trocar, to be fixed in the same manner, and fitted with a corresponding plug or stopper, similar to fig. 3.

PLATE LVII.

The figures in this plate represent a set of instruments for the same purpose as those in the preceding plate, a very neat and elegant invention by Dr. Monro, and the following explanation of them is in the Doctor's own words :

Fig. 1. A trocar of an ordinary shape, and of a proper size.

Fig. 2. A steel canula with a handle : the canula is open on one side, and thin at its point, that it may pass easily with the trocar into the bladder.

Fig. 4. Gives a side view of a blunt silver canula, which, after the trocar is withdrawn, is to be introduced through the steel canula, which has a broad shield with holes in it for fixing it by ligatures in its place : two views are given of the canula ; the oblique view of it shews the direction that it should have in passing into the bladder, which should be downwards and backwards, that it may be in less danger of injuring

the back part of the bladder. A, a plate to be held between the finger and thumb, while the steel canula is withdrawing. B, the end of the silver canula, to be passed through a hole in a piece of waxed or oiled silk, and then tied to it: this piece of waxed silk saves the skin from being excoriated, and serves, besides, to direct, occasionally, the urine into a basin.

Fig. 5. A small silver plug to be put into the end of the silver canula, in order to prevent the constant escape of urine: this is to be taken out from time to time, and the urine received into a basin.

Fig. 6. A perpendicular view of the shield. A, The top of the canula. B, a plate of metal which serves as a handle, and likewise to connect the canula to the shield. C, a large opening through which the handle A of the steel tube, fig. 3. may pass, and as the opposite side of the steel tube has a slit in it, the steel tube can be withdrawn after the silver canula has been passed through it into the bladder.

DDDD, Holes in the shield, by means of which, a circular strap put round the body, may be readily connected with it for supporting it exactly in its proper place.

PLATE LVIII.

The figures of this plate represent an apparatus for the cure of hydrocele with injections: the method of using it is described in Chap. XXIV. Volume III. page 87. The syringe, Plate LXVII. fig. 5. may also be adapted to fig. 2. of this plate, and used instead of the bag of *resina elastica*, fig. 1.

PLATES LIX. and LX.

The instruments of both these plates represent a very ingenious improvement of the gorget by Dr. Jeffrey of Glasgow; in which, besides an alteration in the form of the gorget, a blunt and cutting gorget,

are very neatly connected together, as may be seen by the following explanation.

Fig. 1. Represents a double gorget with a spring, having the cutting gorget drawn back.

a, a, The handle. *b, b*, The blunt gorget, with *c*, its knob, whose spine runs, for some way, down on the blade. *d, d*, The cutting gorget. *f*, A slit, in the anterior end of the cutting gorget; on the right of this slit, the edge is sharp; on the left, it is blunt. *g*, A thumb piece. *h*, A flat spring passing down from the base of the cutting gorget into the hollow handle *a, a*. *k, k*, Two nails connecting the two gorgets together in a way afterwards described.

Fig. 2. Represents the same gorget, having the cutting gorget pushed forward and prepared for the operation.

a, a, The handle. *b*, The blunt gorget with *c* its knob. *d*, The cutting gorget, with its sharp edge projecting, and its slit receiving, and kept from moving to either side, by the spine of *c*. *e*, The thumb piece raised.

Fig. 3. Plate LX. A back view of the gorget. *a*, The back plate, thin, and slightly convex, covering parts represented in the following figures.

Fig. 4. A front view of the blunt gorget. *a, a*, The metallic part of the handle, with holes in it for the screw nails that fix on it the hollow wooden part of the handle represented in fig. 5. *b*, The blade of the blunt gorget. *c*, A long slit in *b*, in which are two nails. *d, f, e*, The flat thin head, the screwed point, and the roller of these nails. *g, g*, Their heads, and resting lightly on the blunt gorget. *h, h*, Their rollers, in the slit, on a level with the anterior surface of the blunt gorget, their diameter being somewhat less than the breadth of the slit, that they may turn, in the slit, easily on their nails. *i, i*, Their points. When the two gorgets are to be put together as in fig. 1. and 2. Plate LIX. the back of the cutting gorget is applied to the face of the blunt one. The two roll-

ers are laid in the slit of the blunt gorget over the two holes of the cutting gorget seen at *k, k*, fig. 1. the nails are passed through the rollers and screwed into the holes *k, k*, till their flat heads touch the back of the blunt gorget. The back plate is then screwed on, covering the heads of the nails and the slit, making the back of the instrument smooth. These nails therefore not only hold the two gorgets together, but with the spine on the knob of the blunt gorget permit the cutting gorget to move backwards and forwards only, while the rollers make that motion sweet and easy. *k*, Another slit in the blunt gorget, in which the heel of the thumb piece moves. It likewise is covered by the back plate.

Fig. 5. A back view of the cutting gorget. *a*, The wood in part of the handle hollowed out to receive *b*, the flat spring that is connected (fig. 1. and 2.) to the base of the cutting gorget, and terminates in a flat button like head *c*. *d*, The spiral spring, that surrounds the flat spring. One end of this spiral spring rests against or may be fixed into the flat head of *b*; the other rests against or may be fixed into *d*; *d*, the cheeks or anterior end of the groove in the wooden handle. *e, e*, The holes for the connecting and directing nails. *f*, The back of the thumb piece connected by a transverse screw nail to two projections from the back of the cutting gorget. *g, g*, Holes for the nails that connect the wooden and metallic parts of the handle together. *N. B.* Both the cutting and blunt gorgets diminish a little in breadth from heel to point, by which the cutting gorget when pushed forward is broader than that part of the blunt gorget immediately behind it. When, however, the cutting gorget is drawn back, it is narrower, and is defended by that part of the blunt gorget before which it lies.

From the figures and the description of this instrument, the manner of using it will be understood. The surgeon holding it in his right hand as he does the common gorget, raises the thumb piece, and applying

his right thumb to it, pushes forward the cutting gorget till the anterior connecting nail reaches the end of the slit, the button like head of the flat spring, following the cutting gorget, compresses the spiral spring. The cutting edge now projecting, and the instrument being in every essential point like the common cutting gorget, is introduced into the bladder in the usual way; but as soon as this is done, the surgeon, without taking his left hand from the staff, or deranging his right hand, raises his right thumb; the cutting gorget is instantly drawn back, the thumb piece falls down; and the gorget, now in every material article a blunt gorget, remains in the wound, presenting a smooth surface, for conducting the finger or forceps, into the bladder, in quest of the stone.

PLATES LXI. and LXII.

In these plates are represented an apparatus for removing curvatures of the spine. The invention is very ingenious, and we owe it to Mr. Le Vacher, who made it public in the year 1768, in the fourth volume of *Mémoires de L'Académie Royale de Chirurgie de Paris*. It has since that period been improved by Mr. Philip Jones of London.

The chief intention of this instrument is to support the head, and gently to stretch the spine: the stays D D, Plate LXII. to which the instrument is attached, must be exactly fitted to the patient: E E E, are three loops of iron fixed to the stays, through which a firm steel rod A B C is passed to such a height, that the point of the curve at A may nearly touch the forehead: G, is another curve of polished steel, neatly adapted to the upper part of the head, over which it passes from ear to ear; and it is attached in a pendulous state by the screw K to the rod A B C, upon which it moves backward from A at pleasure. H H H is a strap of firm leather, covered with silk, passing round the occiput, and fixed sufficiently tight on two

hooks or knobs to the two ends of the curve G. II is another strap of the same kind that passes beneath the chin, and is also attached by knobs or hooks to the curved plate G. On a proper application of these straps, the utility of the instrument in a great measure depends. The one should cover the chin, and the other be entirely below the occiput, and both of a degree of tightness adapted to the feelings of the patient.

The instrument being fitted to the patient in the manner represented in Plate LXI. the head is thereby completely supported, at the same time that the body is kept erect by the steel rod ABC. This rod should at first be placed as high as the patient can easily bear it, and every three or four days it should be raised, which is easily done by touching the spring F; and after drawing the rod upwards, it is again firmly fixed by letting the spring fall into the corresponding notch.

In all curvatures of the spine, this machine proves useful, particularly where the disease is recent; but it requires to be worn for a great length of time: it soon tends to lessen the deformity, but the parts quickly return to the same degree of curvature if it be not continued for two or three years.

PLATE LXIII.

Figs. 1, 2, and 3, represent different parts of a machine for injecting tobacco smoke into the rectum.

Fig. 1. A brass box for containing the burning tobacco. The mark A is a bottom or division in the inside of the box, perforated with small holes to admit the passage of the smoke to the extremity of the box B; which, by a male screw, is adapted to a brass tube, fig. 3, at C, which is again fitted to an elastic leather pipe D, terminated by a common glyster pipe E. The pipe D is made of waxed leather, protected by brass wire rolled spirally round it from one end to the other.

Fig. 2, represents the covering of the box, figure 1, to which it must be exactly fitted. F, a division of thin brass, perforated with a number of small holes for admitting the passage of the air from a pair of bellows fitted to the opening G.

Fig. 4. The instrument completely fitted on a small scale. H, a pair of double bellows, whose tube I is fitted by a screw to an opening in the cover of the box K, which again is terminated by the brass tube L, the leather pipe M, and the ordinary glyster pipe N.

The box K being filled with burning tobacco, and the glyster pipe N being inserted into the anus, by working the bellows H, any necessary quantity of smoke may be very quickly thrown up.

It is scarcely necessary to observe, that all the parts of this machine ought to be exactly fitted to each other, with a view to prevent the escape of smoke at any of the joints.

Bellows of the ordinary size answer the purpose; and are preferable to those that are smaller, as being better calculated for injecting the smoke quickly. The brass box for the tobacco should be about an inch and half in diameter, by three inches in length from the brim to the bottom; the brass tube connected with the box should be six inches in length, by a quarter of an inch in diameter. The leather pipe ought to be of nearly the same diameter with the tube, and about two feet and a half in length. When of this length, it is easier managed than when shorter; and it serves more effectually to cool the smoke before it reaches the bowels.

The glyster pipe, at the end of the leather pipe, ought to be somewhat larger and wider than those in ordinary use.

PLATE LXIV.

Fig. 1. Another instrument for injecting tobacco smoke, originally invented by the celebrated Professor

Gaubius. The principal difference between this and the instrument represented in Plate LXIII. is, that in this the tobacco box *A*, is fitted to the air hole of the bellows; so that in working the bellows, the air with which they are supplied entering at the openings *B*, the smoke of the burning tobacco must accordingly pass through them; and from the bellows it is thrown into the other parts of the instrument, and in that manner transmitted to the intestines.

The instrument represented in Plate LXIII. is wrought with more ease than the one here delineated.

Fig. 4. A crooked bistoury, with a blunt or probe point. The curve here represented is much less than is usually given to this instrument, and the blade is also much narrower: it ought, indeed, to be altogether straight, excepting a very slight curvature towards its point.

This bistoury is well calculated for dividing the stricture in cases of hernia; for opening sinuses in every situation; and particularly for dividing the rectum in the operation of the fistula in ano.

Fig. 3. A bandage for compressing the temporal artery. It is made of a well tempered steel spring, covered with soft leather, and of the same strength with what is used for the truss of a hernia. It should be three quarters of an inch broad, and fourteen or fifteen inches in length. I once had a screw, fitted with a button to this bandage, the button, by means of the screw being made to press upon the divided artery; but a compress of linen answers better, and is easier for the patient. Bandages of linen, or other materials of a yielding nature, do not answer so well for this purpose as those of spring steel, which remain with more certainty on the spot on which they are first placed.

Fig. 2. A bistoury with a greater curvature than the other, which in sinuses of particular directions sometimes prove useful.

PLATE LXV.

Fig. 1. A spring truss for an inguinal or femoral hernia of the right side. A, the bolster or pad for pressing upon the opening at which the parts protrude. B, a strap with holes in it for fixing upon the knobs on the back part of the pad. C, a strap hanging down from the back part of the bandage, to be passed between the legs of the patient, and to be also fixed upon the knobs of the pad by the holes in its extremity.

This strap is intended to fix the bandage firmly in this situation; but if the bandage is properly made, and the steel spring of which it is composed is sufficiently elastic, there is no necessity for this strap, which always frets and galls the parts upon which it is made to pass.

Fig. 2, represents a bandage also for the right side, but with no back strap, and by means of a ratchet the pad can be made to compress the parts more or less even after the belt is fixed.

Figure 4. A double bandage for a hernia on each side, with two back straps connected with it.

The steel of which these bandages are made should be covered with thin soft leather, properly stuffed with wool or flannel. The pads should be broader than they are usually made, with a prominence or slight elevation in the middle, and their sides perfectly flat.

Fig. 3. Represents a bandage for umbilical ruptures. A, a steel spring to be applied upon the umbilicus after the hernia has been reduced, and to be retained in its situation by the bandage B; which, by means of the straps C C C and the buckles D D D, may be kept at any degree of tightness. E E, two straps for passing over the shoulders; and F, a strap for passing between the legs, the whole to be fixed upon knobs on the back part of the bandage opposite to the spring A. By means of these buckles and

straps, the bandage may be preserved very firmly in its situation.

The belt B should be five or six inches broad, and the steel spring A should be of a size proportioned to the opening it is intended to press upon. All the parts of the bandage should be of soft leather, lined with flannel or cotton.*

PLATE LXVI.

Fig. 1. A pessary for herniæ falling into the vagina: it may be made either of resina elastica, ivory, or lignum vitæ.

Fig. 2. A flat hook, for the purpose of elevating Poupart's ligament in operating for a crural or femoral hernia.

Fig. 3. A small director, open at the point or extremity, a very useful instrument in the operation for the reduction of strangulated hernia.

Fig. 4. A silver canula for passing into the urethra after amputating the penis: the threads attached to it are meant to fix it to a small circular roller round the penis.

PLATE LXVII.

Figure 2. A trocar, the invention of Mr. André.
 Fig. 3. The canula of this instrument is formed of two hollow plates of elastic steel, firmly united together at their larger extremities by two screw nails. The tube formed by these two hollow plates is of such a size as to allow the perforator, fig. 1. to be pushed into it with very little force; and the elasticity of the plates, which admits of their yielding to this passage of the perforator, enables them to return instantly to form the same size of tube, as soon as the large extre-

* The spring here represented is taken from a figure represented by the late Dr. Monro in his treatise on that subject. See his works in 4to.

mity of the instrument A has fairly passed the extremity of the plates.

The point of the perforator with a small portion of the extremity of the tube being pushed into the vaginal coat, the perforator is to be then withdrawn, which, when the instrument is properly made, may be done without much force.

The chief advantage of this instrument is, that the point of the perforator making a larger opening than the canula, the latter thereby enters with much ease.

But although this invention of Mr. André's is neat and ingenious, it does not appear to be very necessary; for, when the flat trocar, fig. 4, of the same plate is well finished, and the silver at the extremity of the canula is thin and properly fitted to the perforator, it enters with sufficient ease, as also happens with the trocar of Mr. Wallace, described in figure 1, Plate LXXIII. while neither of these instruments is liable to the important objection that occurs to that of Mr. André, noticed in the explanation of that plate. The canula of Mr. André's instrument has also this disadvantage, that being made of polished steel, it is almost impossible to make it so dry after being used as to prevent it from suffering with rust, where the two plates are fixed together by screw nails.

Fig. 5. A syringe for throwing liquids into the tunica vaginalis testis in the cure of hydrocele by injections, for which purpose it requires to be exactly fitted to the tube fig. 2. Plate LVIII.

PLATE LXVIII.

Figs. 1, 2, and 3, represent a set of instruments for the operation of the phymosis, described in Chapter XXVIII. Vol. III. page 140.

PLATE LXIX.

Figs. 1, and 3. Staffs for the purpose of sounding.

Fig. 2. A grooved staff for the operation of lithotomy, with the groove on one side. This improvement was suggested for the purpose of passing the gorget more easily into the bladder; but the usual form of the staff is found to conduct the gorget with much ease; so that this alteration has not been generally adopted.

Fig. 4. A common staff of the usual form, with the groove on the convex part of it.

The curvature here given to these instruments has by experience been found to answer better than any other: there is no necessity for that degree of convexity generally given to staffs: the form here represented is introduced with more ease; and does not injure the urethra, which those with a greater curvature very commonly do. A staff entirely straight may be easily passed into the bladder, merely by stretching the penis in such a manner, that the urethra may be kept in a direct line with the arch formed by the junction of the ossa pubis: but a staff entirely straight is ill fitted for exploring the different parts of the bladder; so that some degree of curvature is with much propriety given to it.

A staff for a full grown male subject should be twelve inches long, besides the handle; and seven or eight inches for children of seven years and under.

PLATE LXX.

Fig. 1. A side view of the cutting director described in Vol. III. Chap. XXIX. Sect. VII. This instrument for adults should be five inches and a half from A to B, and three inches from B to C.

Fig. 2. represents a front view of the same instrument.

Fig. 3, affords a back view of it; and figure 4, a transverse section.

This director, in the grooved part of it, should be three-eighths of an inch broad, namely from D to E;

and the cutting part of it, from F to G should be nearly an inch. The beak should be exactly fitted to the groove of the staff with which it is to be used.

In order to obtain a free passage for the stone, it has been proposed to increase the breadth of the cutting part of Mr. Hawkins's gorget to a great extent: by some, it has even been said, that it may be two inches broad. This, however, proceeds from inattention to the anatomy of the parts concerned in the operation; for that part of the urethra through which the gorget must pass to the bladder, is so much confined by the contiguous bones, that it is not possible to pass a gorget of this size into it in a proper direction. The prostate gland should be divided laterally in a horizontal direction. Now, this cannot be done with an instrument of this breadth. But, even although it were easily practicable, there is no necessity for such an extensive wound as this instrument would make. I have elsewhere said, that nothing should be left for the director or gorget to divide but the prostate gland, together with a very small portion of the neck of the bladder; and as this is done in the most complete manner, both by the cutting director of this plate, and the improved gorget of Mr. Hawkins in figs. 1, and 2, Plate LXXI. an instrument of a greater breadth is not necessary.

The back part of the cutting director being considerably narrower than the common gorget, it ought to be sufficiently strong to overcome any resistance with which it may meet in passing into the bladder. The transverse section, fig. 4, shows the strength of it.

For children from three to seven years of age, this instrument should not exceed three inches in length; and one of four inches will answer for every age above this to the twentieth year.

The cutting edge of this director, as well as the cutting part of the gorget in Plate LXXI. is represented upon the right side of the instrument, by which

the wound in the operation of lithotomy is made in the left side of the patient : but for a surgeon who operates with his left hand, this must be reversed, so that the cut may be made in the right side of the perinæum.

Fig. 5. A grooved staff for the operation of lithotomy in females.

PLATE LXXI.

This instrument should, for adults, be five inches and a half in length besides the handle ; an inch and a quarter broad at its widest part, and made to contract gradually to the point : the beak should be exactly adapted to the grooves of the staffs with which it is used ; and should be turned a little forward, instead of being perfectly straight or turned back as is sometimes done : by this means it is carried with more steadiness along the groove of the staff than can otherwise be done. In Vol. III. Chap. XXIX. Sect. VII. I have mentioned some objections to this gorget, and the reasons that induce me to consider the alterations made upon it in fig. 1. and 2. of the same plate, as well as the cutting director Plate LXX. as preferable instruments. In fig. 1, and 2, the left or blunt side of the gorget is not near so broad as in the gorget of Mr. Hawkins, by which it enters with more ease, and does not tear the parts so much. The handle goes off nearly at a right angle from the body of the instrument, instead of having an oblique direction as in figure 4 ; and being made of timber instead of steel, the surgeon holds it with more ease and firmness.

Fig. 3. A female catheter. This instrument is represented straight, as being more easily introduced than when much crooked : a sound for females however, should have a small curvature, as being better adapted for discovering a stone in the bladder than a straight staff. A grooved staff of this form is represented in fig. 5, Plate LXX.

Fig. 4. The cutting gorget of Mr. Hawkins, with the edge made to expand more than the usual form of this instrument, by which it divides the prostate gland more freely.

PLATE LXXII.

Fig. 3. An instrument I have named a searcher.

In lithotomy it frequently happens, that the stone is not readily felt with the forceps. When not discovered by the other means I have advised, it may frequently be found by introducing this instrument at the wound; being thick it answers better for this purpose than a common sound; and when once the stone is discovered, the searcher should be kept in close contact with it with one hand, while the forceps are conducted to the stone by means of it with the other. In this manner, stones are sometimes discovered, which could not otherwise be met with. This instrument should be made of steel, and should be nine or ten inches in length.

Fig. 2. A male catheter of silver. The small holes near the extremity of this instrument answer better than a slit on each side, as with these it does not so readily catch the membrane of the urethra. Catheters have likewise been made of other materials, namely, of leather, and of flexible silver wire rolled into the form of a tube, and covered with bougie plaster; and a few years ago a very neat invention appeared, prepared of *resina elastica*. These last prove particularly useful in cases that require catheters to remain in the bladder for some days together; and of late I have found, that when properly prepared, they retain their firmness for a considerable time. I have kept a catheter of this resin in the bladder for three weeks together, without being hurt by the urine.

Fig. 1. Is an improvement on the gorget by Dr. Monro. It consists of a common gorget A B, with a blunt gorget C D fitted to it: the nail E fixed in the

cutting gorget passing through the slit in the blunt gorget F, the latter is thus made to run easily upon it. In using this instrument, the blunt gorget must be pulled back, so as to admit of all the cutting part of the other to project before it: and as soon as it has reached the bladder, the blunt gorget should be pushed forward; by which means the contiguous parts are effectually protected from farther injury, as the side of the blunt gorget should be made considerably deeper, so as to project over the cutting edges of the other.

This is an ingenious contrivance; and it answers the purpose completely, of protecting the surrounding parts, while the instrument is withdrawing; a point of much importance, and not always duly attended to.

PLATE LXXIII.

Fig. 1. A flat trocar, a very neat invention of Mr. Wallace, a surgeon of eminence in Glasgow. This instrument consists of a stilette or perforator, fig. 3. exactly adapted to the silver canula, fig. 2. The canula is open on one side, which admits of the perforator being broader than itself, as is represented in fig. 1. By this means an opening is made by the perforator, which allows the canula to pass with ease, and as the sides of the canula do not fall together on the perforator being withdrawn, this instrument is not liable to an objection that occurs against the trocar of Mr. André, represented in Plate LXVII. fig. 2. with which there is some risk of the steel plates doing harm to the contents of the abdomen on these plates falling together, which they do with some force on the canula being withdrawn.

Fig. 4. A trocar of a common triangular form, for the purpose of puncturing the bladder: the round or triangular form of this instrument makes it more proper for this operation than trocars with a lancet point, which are not so well adapted for the different

steps of the operation ; and the groove in the stilette or perforator, by commencing at the point, and being continued through the whole length of it, serves to mark with much certainty its entrance into the bladder, for the urine flows along the groove immediately on the point of it having entered the bladder.

Fig. 5. A flat silver canula, with a small curvature for leaving in the opening after the operation for the empyema.

PLATE LXXIV.

Fig. 1. An instrument invented by Dr. Butter for injecting liquids into the bladder : A A, the handles of two thin plates of timber, which serve to compress a bladder placed between them, in which the liquor to be injected is contained. B, the stop-cock of a pipe, with which the bladder must be connected : and to the extremity of this short pipe a larger tube C is adapted, to be inserted into the urethra when the liquid is to be injected. Fig. 4. is a funnel for conveying the liquid into the bladder, by inserting the small end of it into the short pipe near to B, on the tube C being removed.

Fig. 2. and 3. Two pessaries for supporting the prolapsed parts in cases of prolapsus uteri, and for compressing the urethra in incontinence of urine. Before being introduced, they should be immersed in oil ; and they should be made to lie directly across the vagina, so as to support the prolapsed parts as much as possible. These instruments may be made of any timber capable of receiving a fine polish : but much attention I may remark, is necessary to this circumstance ; for unless they are perfectly smooth, they cannot be continued. Pessaries tend to support the relaxed parts better than any other remedy ; but even polished in the best manner, they are apt to excite so much irritation as to become altogether inadmissible.

PLATE LXXV.

Fig. 1. and 2. Forceps of different sizes for extracting stones from the bladder. For a full grown adult they should be ten inches long and proportionably strong. Every operator ought to be furnished with three or four sizes from those of ten inches to such as do not exceed seven. I have already desired, that the blades of the forceps may not meet when shut; otherwise they are apt to lay hold of the bladder: and for the same reason, their teeth ought not to be long. The hollow part of the blades should be rough, by which they fix the stone with sufficient firmness; but even this roughness should be confined to within an inch of the point; for when it extends to the joint, small stones are apt to fix in this part, and to dilate the blades of the instrument much more than they otherwise would do.

Fig. 3. Forceps with a small curvature. When the forceps of the usual form do not easily lay hold of a stone, such as are somewhat crooked will sometimes meet with it: in general, however, straight forceps answer all the purposes of the others; and as stones, when laid hold of, are always more easily taken out with straight forceps, they should commonly be preferred.

PLATE LXXVI.

Fig. 1. and 2. Different views of Frère Cosme's instrument for the operation of lithotomy. Fig. 1. Represents the instrument shut; and fig. 2. gives a view of it open. The handle A, with which the niches B are connected, being kept in the situation represented in fig. 1. by the spring C being fixed in one of the niches, the knife is thus kept shut. But when the spring C is pressed upon, so as to raise it out of the niche, as the handle A is made to move upon a pivot,

it may now be turned ; and the projecting part of it *D*, being turned fully round, if pressure is now applied to *E*, it will raise the knife *F*, fig. 2. with which it is connected, to the elevation here represented. The point *G* should be made blunt and round, so as to run with ease and freedom in the groove of a staff. The length of this instrument, including the handle, should be ten inches.

The method of using it, is as follows : all the previous steps of the operation being finished, and the urethra being cut in the manner I have directed in the lateral operation, the beak of the instrument *G* is to be conveyed into the groove of the staff, and while shut pushed into the bladder. The staff is now to be withdrawn ; and pressure being applied to *E*, so as to elevate the knife *F*, it is now to be drawn out in such a direction as to divide the prostate gland laterally, when the forceps may be either introduced by running them in upon the forefinger of the left hand, or upon a blunt gorget employed for the purpose.

Various instruments of this kind have been invented ; but this is the most simple, and in every respect, indeed, the best of any that I have seen. As the operation is still performed with it in different parts of Europe, particularly in France, I think it right to represent it, but not with a view to recommend it. The objections which occur to it are these : although by the form of the handle the blade or cutting part of the instrument may be elevated to any necessary degree, yet this does not ensure the formation of a wound of a fixed and determined size. It has indeed been asserted by those who think favourably of this instrument, that a wound of any determined size may be made with it ; but this is by no means the case ; and whoever will give it a trial will find, that the wound which it makes varies in size in every two that are cut with it, even with the blade at the same degree of elevation ; for the cutting part of it is at such a distance from the handle, that it is impossible for a surgeon al-

ways to withdraw it so steadily, as to cut uniformly in the same direction; and if in one case it is made to press more to one side than in another, the wound which it forms will not only be of a different size, but different parts may be cut by it.

But the most material objection to this instrument is, that it is apt to injure more of the bladder than ought to be cut. The prostate gland only, together with a small portion of the neck of the bladder, should be divided by this knife; but as it is always necessary to insert the point to a considerable depth, before this can be done, the sides and even fundus of the bladder are in this manner very apt to be injured.

The only advantage which this instrument is supposed to possess over the cutting gorget or director is, that being inserted shut, and withdrawn open, only one cut is made in the parts through which it is made to pass; whereas, it is alleged, that in the usual method of employing the gorget or director, one incision is formed by the introduction of the instrument, and another when it is withdrawn. But, by attending to the directions that I have given in Chap. XXIX. this inconvenience, commonly attributed to the gorget, and consequently to the director, may be always avoided; and as these instruments form a more free cut than the lithotome cachée, while they do not so readily injure any part of the bladder which ought not to be cut, they should therefore be preferred.

Fig. 3. Forceps with a screw H passing through their handles. When a stone is properly fixed in the forceps, various inventions have been proposed for preserving them in their situation; but those that I have here represented are the best and the most simple of any that I have seen.

PLATE LXXVII.

Fig. 1. A jugum for compressing the penis, and it should be made to fit upon the parts without produc-

ing pain or uneasiness. It consists of a piece of elastic steel lined with velvet or soft flannel. By means of the screw A, it can be made wide or strait at pleasure; and the cushion B being placed upon the urethra, any necessary degree of pressure may be made with it, by turning the screw with which the cushion is connected. By means of this cushion and screw, the pressure is chiefly confined to the urethra; so that the circulation is scarcely interrupted through the rest of the penis.

Fig. 2. A receptacle for the urine. It may be made either of tin, silver, or any other metal. It is somewhat convex on one side, with a concavity on the opposite side, fitted to the inside of the patient's thigh. D E, Two tubes for fixing two pieces of tape, by which, when the penis is put into the neck of the instrument, it may be tied to a circular bandage round the body; and the tube F serves to fix a piece of tape for tying it round the thigh of the patient.

This instrument, when properly fitted, fits easily, and has frequently proved useful to patients who could not retain their urine, and with whom the jugum, for the reasons I have formerly enumerated, could not be employed.

A receptacle of this kind, of a size sufficient to contain three or four gills, may be so adapted to the thigh as to admit of every necessary exercise.

Fig. 3. A bandage, originally invented by Mr. Gooch, for retaining the rectum in prolapsus ani. I, a plate of elastic steel covered with soft leather, exactly fitted to the parts on which it rests; and the cushion K should be stuffed in such a manner as to produce an equal and easy pressure on being applied to the end of the gut after it is replaced. H, a strap to be fixed with a buckle on the forepart of the body above the pubes; and G G, two straps connected with the upper part of the instrument, which, by passing over the shoulders, and being fixed by small knobs on each side of the buckle, serve to retain it exactly in its place.

PLATE LXXVIII.

When treating of lithotomy, in Chap. XXIX. I had occasion to notice the risk attending the extraction of a large stone; and when a stone proves to be so large as to give cause to suspect that it cannot with safety be taken out entire, I have given it as my opinion, that it should rather be broken into different pieces: for this purpose various instruments have been proposed. Fig. 1. represents forceps with long teeth, by which almost any stone may be broken. By the screw and lever connected with it, a much greater force may indeed be employed than will commonly be required: these forceps should be twelve inches in length, and of a sufficient firmness in every part, particularly in the joint, for bearing any force that may be needed.

Fig. 2. A scoop for extracting such small pieces of stone as cannot be taken out with common forceps.

Fig. 3. A silver canula for inserting into the wound after the operation of lithotomy, for compressing such arteries as lie too deep to be tied with ligatures. This tube should be of a flat form: for a full grown adult, an inch broad, and four inches in length; and before being introduced, it should be covered with several plies of soft old linen. There should be two holes in the brim of the instrument for connecting it by means of two pieces of tape to a circular belt round the body.

PLATE LXXIX.

The figures in this Plate represent an apparatus for the cure of a rupture of the tendo achilles; of which an explanation is given in Volume I. Chapter III. Section VII.

PLATE LXXX.

This figure is the invention of Mr. Chabet of Paris, and is taken from the second volume of Memoirs of

the Royal Academy of Surgery : it is the best instrument that has yet been published for compressing the jugular vein.

PLATE LXXXI.

Fig. 1. A splint of timber for a fractured leg ; A A two loops for retaining leather straps, as represented in the front view of the same splint in figure 2, C C. B, an opening for receiving the external maleolus, when the leg is placed upon the outside.

Figures 3, 4, 5, and 6, are perhaps the best splints hitherto discovered for fractures of any of the extremities. They may be made of different forms, but one or other of these will answer almost for any purpose : they are made by gluing a piece of thin timber, about the tenth part of an inch in thickness, upon leather. The timber is afterwards cut down to the leather, either with a fine saw or a knife set to a proper depth, in the manner represented in the figures.

These splints are preferable to those of pasteboard ; for while they are longitudinally perfectly firm, they are transversely sufficiently flexible for plying to the form of the limb. For the method of using them, I must refer to different parts of Sections IX. X. XI. and XII. of Chapter XXXIX.

Splints made in this manner have long been used by individuals ; but Mr. Gooch was the first who gave any description of them.

PLATE LXXXII.

As the splints used by Mr. William Sharpe are still preferred by some practitioners, I have given a representation of them in this Plate.

These splints, figs. 3, and 4, are formed of strong pasteboard made with glue ; and are fixed upon a fractured leg with three straps which surround the whole.

Figure 4, represents an under splint of an irregular form, suitable to that part of the leg which it is meant to cover: it is a little convex externally, and concave internally. The length for a middle sized man, eighteen inches from E to E; the width, two inches and three quarters at the strap near the knee, and two inches and a quarter at both the other straps.

D F, D F, D F, three leather straps from fifteen to twenty inches long, and one inch wide, having two rows of holes so placed, that every hole in each row may be opposite to a space in the other. These must be sewed fast to the middle and outside of the under splint. The portions of straps D D D, on the anterior part of the splint, must be shorter than those on the posterior, F F F, which are to surround the more muscular part of the leg.

G, a part to support the foot from the point E to the heel H, five inches long at an angle of sixty degrees.

C, The foot-strap, twelve inches long, sewed to the bottom of the under splint, within two inches of the point, to pass under the heel, and through the leather loop B on the upper splint, to be fixed to the lowest pin A, in fig. 3.

I, An irregular oval hole, two inches long, and almost one wide in the lowest part, but decreasing upwards, to receive the maleolus externus, or lower extremity of the fibula.

Figure 2, represents the leg raised up, to shew the situation of the under splint, when properly applied.

Fig. 3, The upper splint. A A A, the pins upon which the straps of the under splint are to be fixed, by means of the holes D D D, F F F. B, The leather loop for receiving the foot-strap C, in fig. 4.

Fig. 1, represents a fractured leg when laid within the splints, having the foot of a stocking and a shoe fixed on it.

PLATE LXXXIII.

In this plate I have delineated the instruments recommended by the late Mr. Gooch, for preserving a fractured thigh and leg in a state of extension, as is mentioned more particularly in Volume III. page 360, and which I shall describe in his own words.

Fig. 1. A machine for extending a fractured leg. The transom to which the sole is secured, is made to be opened and fixed by a pin; and the machine may occasionally be made wider, as appears by other holes in the transom; about which, on each side of the sole, fillets are to be tied, coming from a dimity piece quilted for ease, and laced round the heel and instep, to make the extension upon the working of the screws; but buff leather may possibly answer better for protecting the parts even than dimity.

Fig. 2, shews the machine, and one of the splints in Plate LXXXI. together upon the limb.

Fig. 3, The longitudinal parts of the machine for the thigh are designed to move upon the circular plates; by which means it may be accommodated to limbs of different sizes: and as there is a pin at each end of the circular plates, if the limb happens to be larger than ordinary, straps of leather may be added.

Fig. 4, shews the machine with the case upon the thigh.

Fig. 5. The key to work the screws. There should be two such keys, that the machine may occasionally be wrought on both sides at the same time.

PLATE LXXXIV.

In Volume III. page 360, I have observed, that some improvements had been made by the late Dr. Aitken upon Mr. Gooch's instruments, represented in the preceding plate, for extending fractured limbs: in this plate I have given a representation of these improvements.

Fig. 1, represents a machine for keeping the fragments of the thigh bone in situ after being set, whether the fracture is simple or compound, on the neck or body of this bone. A A A, the upper circular which applies round the pelvis, like the top band of a pair of breeches. It rests on the same parts, and is fixed or buttoned in the same manner, by the studs and corresponding holes H.

B B, Two soft stuffed straps fixed to the back part of this circular, of such lengths as to pass between the thighs from behind forward, to tie round the forepart of the same circular, by means of their forked extremities C C. These effectually secure the circular from moving upward. There are two obscure joints K K, in the back part of this circular, to facilitate its application; but it applies readily enough without them.

D D, The lower circular which fixes above the knee at the gartering place.

E E E, Three graduating steel splints which extend from the one circular to the other: their upper extremities are fixed to the upper circular by vertible flat headed studs, similar to those at F F: their lower extremities pass through the iron screw plates G, firmly rivetted to the lower circular. The splints are provided with a number of impressions or holes, in which the screw nails which pass through the plates are fixed. By pushing the splints from below upward, the distance between the circulars is increased; and by turning the screw nails, it is maintained: consequently, that part of the thigh included between the circulars can be kept extended at pleasure. The splints here are fixed for the right thigh; the pricked lines on the other side, shew how they may be accommodated for the left thigh, or for both at the same time.

The larger circular A A A, consists of a piece of thick saddle leather; all except its perforated part, and about a quarter of an inch on each edge, is covered on the inside with a flexible thin iron plate, such as is sometimes used by tin plate workers: over this

it is lined with the softest buff, or shamoy leather, between which and the plate a thin layer of hair or wool is interposed: the lining ought to project on both sides half an inch or more, to prevent it in any degree from pressing on the skin.

The small circular DD, or inferior fixed point, is exactly similar to the large one in structure, the tin plate excepted: which, on account of its smaller diameter, was found to be unnecessary.

The breadth of the upper circular, when extended for an adult, may be from three to four inches: that of the under circular should be in the same proportion.

The graduating steel splints E E E, must be sufficiently long to extend from the upper circular to the lower, and to project over it about a hand breadth: they require to be about four or five eighth parts of an inch broad, and about one-eighth part of an inch thick.

Fig. 2. A machine constructed on the same principle with fig. 1, for the retention of a fractured leg.

A A, a circular which applies below the knee joint.

B B, Another which fixes at the ankles.

C C C, The graduating splints similar to those of the thigh machine, both in construction and action.

Fig. 3. A fracture box mentioned in Vol. III. page 379, as the invention of Mr. James Rae, surgeon of this place, improved by Mr. John Rae, his son.

A, The sole or base, which should be a firm board, an inch and half thick. B B, the two ends which support the side beams C C C C. D, a brass hinge, which, with a corresponding hinge on the other end of the machine, admit of the ends folding down so as to render it more portable than it otherwise would be. L L, two parallel grooves for receiving two projecting parts of the corresponding end of the machine, by which the same instrument may be extended or shortened so as to fit any length of member. E E E E,

Two lateral beams, which by their holes in their extremities, will serve for any length to which the instrument may be extended : and by a pin at each end passing through the holes in the end beams, any one of the sides, or both of them, may be raised at pleasure.

G G G G, &c. Twelve or fourteen buckles on each side of the machine, with corresponding pieces of girth two inches broad, on which the member is supported by buckling them exactly to the form of the limb. H I, H I, Two straps, with corresponding buckles for fixing the base of the machine to the bed. The limb is fixed to the machine by two straps and buckles, one fixed at each end.

The advantages of this instrument are, that in compound fractures the sores can be inspected and dressed without deranging or moving any part of the limb, merely by removing such of the straps as are opposite to the sores. Instead of a twelve or eighteen tailed bandage of the common form, separate pieces of flannel should be used ; so that such of those as are wet with the discharge can be easily moved without touching the rest.

In this manner sores may be daily dressed without being moved till a cure is accomplished, while the limb may be raised to any angle, by heightening one or other of the ends of the lateral beams by means of the holes and pins at each end.

PLATE LXXXV.

Fig. 1. A fractured limb dressed with an eighteen tailed bandage, and laid upon the outside with the knee bent.

Fig. 2. A fractured limb with an eighteen tailed bandage, and one of the flexible splints in Plate LXXXI. There is also placed beneath the limb a firm unyielding splint, such as is represented in the same Plate, fig. 2.

PLATE LXXXVI.

Fig. 1. A machine for retaining the different parts of a fractured patella.

A, a strap to be fixed by means of the buckle at one end on the upper part of the leg immediately below the knee. B, a similar strap to be fixed above the knee.

Fig. 2. A back view of the same machine. F, a femilunar compress of cork covered with shamoy leather, to be placed immediately above the upper part of the patella. G, a similar compress for supporting the inferior part of the bone.

These compresses being properly placed, may be drawn to any degree of tightness by means of the straps and buckles C D E.

Fig. 3. A limb with a fractured patella, and the bandage fig. 1. applied to it. In this figure the strap H is added to it: being fixed to the point of the shoe, and connected with one of the buckles above the knee, the limb is thereby kept extended; by which there is no risk of the fractured parts of the patella being forcibly pulled from each other, as would necessarily happen were the limb to be suddenly bent before the cure should be complete.

PLATE LXXXVII.

Fig. 1. This represents the ambe of Hippocrates, for the reduction of luxations of the humerus: it consists of a fulcrum and moveable lever. As it is still used by some practitioners, I judged it proper to mention it; but I have elsewhere had occasion to remark, that it is a dangerous instrument, and ought never to be employed. My reasons for thinking so are enumerated in Chap. XL. Sect. IX.

Fig. 2. Mr. Petit's instrument for reducing luxations of the humerus. A A, Two arms or horns, by which the scapula is kept firm during the extension. B B, The other end of the instrument resting upon the ground; C, the pulleys; D, ropes, by winding up which with the handle E, the limb may be slowly and gradually extended to any necessary degree.

Fig. 3. G, an opening through which the arm is passed; F F, two apertures for receiving the ends A A of the instrument, fig. 2. This being made of firm leather, the instrument, is thereby prevented from fretting or galling the skin.

PLATE LXXXVIII.

Fig. 1. The ambe of Hippocrates, represented by itself in the preceding Plate, is here applied, and ready to be used.

Fig. 2. Pulleys for extending dislocated bones.

Fig. 3. This is a very useful part of the apparatus for extending dislocated limbs: it is formed of thick shamoy or buff leather. By tying it firmly round the limb with the broad straps at each end, a very considerable force may be applied by assistants pulling the ropes or straps passed over the hooks: it answers the purpose both more easily and more effectually than the common method of extending the limb with towels.

PLATE LXXXIX.

In this Plate I have delineated one of the best instruments hitherto known for dislocations of the shoulders, when more than ordinary force is required. It is the invention of the late Mr. Freke of London.

As instruments of this kind require to be very portable, Mr. Freke has paid particular attention to this circumstance. The box, fig. 5. contains the whole apparatus: when shut, it is only only one foot eight

inches long, nine inches broad, and three inches and a quarter deep. Fig. 4. represents the instrument open, the two sides of the box being firmly fixed together by brass hinges at C, and with two hooks and eyes on the other side of the box. When one end of it is fixed on the ground, the other stands high enough to become a fulcrum or support for the lever B B, which is fixed on the roller E by a large screw of wood, which turning sideways, as well as with the roller, it obtains a circumrotatory motion, so that it may serve with proper attention to reduce a luxation either backward, forward, or downward.

The roller on which the lever is fixed is just the diameter of the depth of one of the boxes, into which are driven two iron pins, the ends of which are received by the two sides of the box, which are an inch thick.

The lever is two feet four inches long, and is cut and joined again by two hinges at C, to fold up so as to be contained in the box; on the back side of it is a hook to keep it straight; the other end of it hangs over the roller an inch and a half, which is to be excavated and covered with buff leather for the more easy reception of the head of the os humeri.

The iron roller E, has two holes through it for receiving two cords from a brace, fig. 3. fixed on the lower head of the os humeri, for on no other part of the arm above the cubit can a bandage for this purpose be useful; for, if the surgeon applies it on the muscular part of the arm, it never fails to slip down to the joint before the limb can be extended.

The iron roller E has a square end, on which is fixed a wheel D, notched round, which works as a ratchet on a spring ketch under the lever; by which it is stopped as it is wound up with a winch, so that at pleasure it may be let loose by discharging the ketch.

The brace, fig. 3. consists of a large piece of buff leather, large enough to embrace the arm, sewed on two pieces of strong iron curved plates rivetted to-

gether, one of them having an eye at each end to fasten two cords in : the other is bent at the ends into two hooks, which receive the cords after they have crossed the arm above.

In order to keep the patient steady in his chair, and to prevent the scapula from raising or depressing the lever, after the limb is drawn forward by the winch, there must be fixed over the shoulder a girth with two hooks at the end of it, such as is represented in fig. 2. The girth should be long enough to reach the ground on the other side, where it must be hooked into the ring B, screwed into the floor for that purpose, as in fig. 1.

PLATE XC.

The figures in this plate represent an instrument mentioned in Chap. XLI. for the purpose of removing contractions of the ham-strings or flexor tendons of the leg.

Fig. 1. A front view of the instrument : A A, two curved steel plates connected together by a firm steel splint D, in fig. 2. One of these is to be applied to the back part of the thigh, and the other to the upper and back part of the leg ; while, by means of the leather straps E E, such a degree of pressure is made as the patient is able to bear.

B B, fig. 1, is a soft cushion of quilted cotton for surrounding the limb to prevent excoriation by the leather straps. The curved plates A A should for the same purpose be lined with shamoy.

Fig. 2. A back view of the same instrument.

Fig. 3. A limb with the instrument applied on it.

PLATE XCI.

Fig. 1. A bistoury with a probe of flexible silver joined to it, for the operation of the fistula in ano, which in various instances I have used. It will be rea-

dily understood, that this instrument will not answer where the sinus does not communicate with the gut.

Fig. 2. A bandage for the paracentesis of the abdomen, originally invented by the late Dr. Monro. This bandage should be made of soft leather, lined with flannel. A, the body of the bandage, which should be of such a length as to pass from one os ilium, across the abdomen, to the other, to be there fixed by the straps BBBB to the buckles C C C C. The straps D D, by passing over the shoulders, serve to fix the buckles E E, which pass through between the thighs; by which almost every part of the abdomen may be sufficiently compressed. When the operation of tapping is to be performed, the bandage should be fixed in this manner, care being taken to leave the hole F open, exactly opposite to the spot in which the perforation is to be made, which for this purpose should be previously marked with ink. On the water being all drawn off, and a pledget applied upon the wound, the opening F must be shut by the strap G, and the buckle H, as represented by the letter I.

In this manner, any necessary pressure may be applied, which, after this operation, is of much importance, and ought not to be omitted.

PLATE XCII.

Fig. 1. An instrument for fixing the canula after the operation of bronchotomy. A, a plate of thin polished steel, with a curvature corresponding to the anterior part of the neck. B B, The extremities of the plate A, with which the straps C C are connected, for the purpose of fixing the instrument by means of a buckle on the back part of the neck. E, A moveable frame, which should be made to pass easily up and down on the two perpendicular branches of polished steel D D, fixed to the inside of the plate A. In this frame there is an opening a little above E, for re-

ceiving the double canula represented by the inferior letter F. The letter F opposite to E, represents a small screw, which passes through the under part of the frame; and by pressing upon the under part of the canula, it thus serves to fix it exactly where it is placed after the operation.

As the frame is made to slide easily upon the two branches D D, and as the double canula F can be inserted to any depth in the trachea, and can be fixed by the screw passing through the under part of the frame, this instrument is accordingly found to answer every purpose expected from it. It is the invention of Dr. Monro, and it has in different cases been employed with advantage.

Fig. 3. An instrument for perforating the trachea in the operation of bronchotomy. G, The point of the perforator passing through the double canula H.

Fig. 2. A representation of the double canula unconnected with the perforator.

PLATE XCIII.

Fig. 1. A machine invented by an ingenious tradesman of this place, the late Mr. Gavin Wilson, for distortions of the leg. This subject was treated of in Chap. XLI. A, a case of firm leather open before, for receiving the distorted leg and foot. B, a splint of iron for giving additional firmness to the case. The leg being placed in this case, the foot is fixed down to the bottom or sole by the strap H passed through the hole I; and the leg itself is gradually drawn either to one side or another according to the nature of the distortion, and secured by a proper application of the straps D F, fixed upon the brass hooks G E. By a due perseverance in the use of this machine, many bad cases of distorted limbs have been completely cured.

Fig. 3. A pair of shoes which have proved useful in some cases of distorted ankle joints, where the toes

have been turned too much inward. Being light, they may be used even in early infancy. After the feet are fixed in the shoes by the laces before, the toes may be separated to a proper distance, and preserved in this situation by the apparatus at A; which consists of three small iron plates, more particularly delineated in fig. 5. and at B, fig. 4. Fig. 5. consists of two parallel thin plates, fixed with nails to the outside of the sole of one shoe; and they are so far separate from each other, as to receive the round plate B between them, the end of which is fixed to the sole of the other shoe. The three plates are connected together by a nail passing through the hole in the centre of all of them. This admits of a considerable degree of motion, by which the toes may be moved either outward or inward; but they can be easily fixed at any particular point by a small iron pin at A passed through one or other of the holes in the side of the plates B.

PLATE XCIV.

In this Plate I have delineated an apparatus mentioned in Chap. XLI. for distortions of the legs.

Fig. 1. A B, An iron splint properly covered with soft leather fixed in an iron frame C. The splint may be made to fix on either side of the frame according as the leg is curved to one side or another. In a distorted leg the foot is to be fixed down to the frame C by means of the shoe represented in fig 3. This is easiest done by passing a nail through the heel of the shoe into the frame, upon which the shoe may move. If the leg is bent outward, the splint A B, fig. 1. is placed on the inside, and it should be of such a length that the pad B may rest upon the internal condyle of the knee joint, where it should be fixed by the strap E, fig. 3. When the bones are bent inward, the splint must be placed on the outside of the leg.

The straps F F must be passed two or three times round the convex part of the leg, which it ought to

compress with some degree of force toward the splint ; and by increasing the pressure from time to time, the curvature or convexity will be gradually lessened till at last it may in many instances be totally removed. By means of the strap G, fig. 3. the toes are to be drawn from that side to which they incline, and fixed to the opposite side of the frame. The screw nail D, fig. 1. determines what is gained from time to time, by moving it from one hole in the frame to another.

Fig. 4. A machine invented by the late Mr. Gooch, for giving support to weak limbs as well as for removing distortions. A A A, three steel bows made thin and very elastic : they must stand clear of the tibia ; must pass about half round the limb, and be fixed with straps of leather upon round headed pins.

B B B, a longitudinal plate, to be made of tough stuff, as the workmen term it, and as light as possible with sufficient strength.

C, the shank to pass into the socket, in that part of the machine which is to be fixed into the heel of the shoe or laced boot, and confined there by a screw at the bottom.

D, The screw to keep the shank in the socket.

PLATE XCV.

I have here delineated a fracture box, mentioned in Vol. III. page 368.

Fig. 1. A A, The base or bottom of the box, formed of deal an inch and half thick. B B, Two ends rising from the base, and terminating in the pillars C C C C. D D, An excavated moveable piece of timber for supporting the fractured limb. This moveable part of the instrument may be raised and supported at any height by the pins E E passing through the holes in the pillars C C C C ; and it may at pleasure be raised at one end and depressed at the other.

H H, Two straps connected with buckles on the opposite side for fixing the limb after it is properly

placed. Before laying down the leg, the dressings should be all applied, and the excavated board should be completely lined with soft wool. G, a hole for receiving the heel to prevent it from being hurt when the leg is stretched out in the manner represented in figure 2.

The ends, B B, may either be fixed to the base of the instrument, or, in order to render it more portable, they may be made moveable, and fixed for use by a double pin at each end, F.

PLATE XCVI.

In Chapter XXXIX. Section X. as well as in other parts of this work, I had occasion to recommend a case for supporting the fore-arm as preferable to any bandage. A representation is given of it in fig. 1.

A A, a case or frame of firm leather, properly lined with flannel or wool, of a sufficient length for covering the arm from the elbow to the point of the fingers. This is intended for the left arm. B, a collar of soft buff leather for passing over the right arm, in order to support the forepart of the case by the strap F passing over the left shoulder, to be fixed to a buckle at C, to prevent the collar B from slipping down. G H, Two straps and buckles for fixing the arm down to the instrument.

The application of this instrument will be better understood by the view of it in fig. 2.

I was favoured with this instrument by Dr. Monro, to whom, I believe, it was sent by Mr. Park of Liverpool.

Figs. 3. and 4. Two artificial legs, delineated by Mr. White of Manchester in his *Cases in Surgery*. Fig. 4. A, a hollow leg made of tin, and covered with thin leather. B a leather strap with a buckle on the outside, for fixing it below the knee. C D, longitudinal steel bars, to be made as tough and light as possible, with sufficient strength. These bars are joined

by a moveable joint, to be placed exactly opposite to the knee joint. E, a steel bow made thin and elastic, to pass about two-thirds round the lower part of the thigh, and fixed with straps of leather to buckle on the forepart.

Fig. 3. Another artificial leg made in the same manner with fig. 4. with the addition of a foot made of light wood and moveable joints, so as to imitate pretty nearly the natural motions of the joints of the ankle and toes.

PLATE XCVII.

Fig. 1. A small spring saw used in amputating fingers and toes.

Figs. 2. and 3. Retractors made of thin iron plates for drawing up and supporting the muscles and other soft parts in amputating limbs while the saw is applied to the bones. They should be kept with openings of different sizes, so that they may answer whether the bone is large or small. These retractors were first proposed by Dr. Monro, and they answer the purpose with much ease to the operator, and perfect safety to the patient.

Fig. 4. A piece of firm slit leather, which also answers the purpose of a retractor. Leather is better suited for this than linen, which is generally used, but neither the one nor the other answer so well as plates of iron.

PLATE XCVIII.

Fig. 1. The saw that I always use in amputating legs and arms: it should be seventeen inches in length, including the handle, and two inches and a quarter in breadth at its broadest part.

Fig. 2. A small double edged knife, commonly termed a catline, for dividing the interosseous ligaments

and other soft parts in amputating the leg and forearm : it should be nine inches long.

Fig. 3. An amputating knife, which answers either for the thigh, leg, or arm : it should be thirteen inches in length.

Fig. 4. A small crooked knife for separating the muscles from the bone in the manner I have advised in Chap. XLIV. Sect. IV.

PLATE XCIX.

In Chap. XLVIII. I gave some account of an ingenious proposal by Mr. Moore of London, for diminishing and preventing pain in several operations of surgery. It is done by compressing the nerves of the limb upon which an operation is to be performed. In this Plate, I have represented the apparatus recommended by Mr. Moore for this purpose.

Fig. 1. A, The compressing instrument, being formed of a curved piece of iron covered with leather, and of sufficient capacity to contain the thigh within its curve.

B, A firm compress of leather at one extremity of the instrument, to be placed on the sciatic nerve.

C, An oval compress fixed on a screw, passing through a hole at the other extremity of the instrument. This compress is placed on the crural nerve.

When the instrument is to be used, it is necessary in the first place to search for the sciatic nerve : for this purpose, let the operator feel for the tuberosity of the ischium, and then for the great trochanter ; and supposing a straight line drawn from the one to the other, apply the compress B about an inch above the middle of that line.

The crural nerve is found by the pulsation of the crural artery, which runs contiguous to it ; the oval compress C must next be applied above it ; and upon turning the screw connected with it, the sciatic nerve is pressed by B against the edge of the sciatic notch,

and the crural nerve against the os femoris to any degree that is necessary.

Fig. 2. Represents the instrument adjusted to the thigh; and fig. 3. a smaller compressor suited to the arm.

PLATE C.

In this plate I have given a representation of an artificial leg and arm made by an ingenious artist of this place, who I have in different parts of this work had occasion to mention, the late Mr. Gavin Wilson.

Fig. 1. An artificial leg made of firm hardened leather.

A, An oval piece of the same kind of leather, lined with shamoy, fixed upon a plate of iron C, and moving upon an axis at the knee. The strap, with the buckle connected with it, serves to fix it to the thigh. There must also be an oval piece connected with a similar iron plate on the opposite side of the thigh: these iron plates and oval pads should together go about nine inches up the thigh.

B, a strap that comes from the sole of the foot, and goes up the inside of the leg to the middle of the thigh, where it is fixed by a buckle to a strap coming from the opposite shoulder; this serves to support the leg, and to take the weight of it more effectually from the weak side than any invention I have met with.

Fig. 3. The oval piece of leather and iron splint to which it is fixed.

Fig. 4. A piece of soft shamoy leather, which fixes by a buckle and strap round the condyles at the knee. In this kind of leg, the person's weight rests upon the condyles and patella, the stump itself hanging quite free within the leg. The band or strap serves in the most effectual manner to prevent pain and excoriation, which otherwise would probably ensue from the friction of the leg against the knee.

Fig. 2. A fore-arm and hand made of the same kind of leather, and made to fix to the arm and shoulder by the straps D E.

These artificial legs and arms are preferable to any I have ever seen. The leg, when properly fitted, proves equally useful with the common timber leg, and it is preferable by being neater; at the same time that it is not apt to break, an accident to which the others are liable: and it answers better than a leg made of copper, from being considerably lighter, and not apt to be hurt in its shape by bruises.

Mr. Wilson makes three different kinds of legs corresponding to the part at which the limb is amputated. In amputating the leg lower than the usual part, that is, in such a manner that the motion of the knee is to be retained, it answers better at the distance of nine or ten inches from the condyles of the knee than either higher or lower. When higher, the remaining part of the leg does not support the artificial leg in walking; and when much lower, the machine must be thicker about the ankle than would otherwise be required, by which it is rendered clumsy and heavy. Fig. 1. in this plate represents a leg for this part.

The second kind of artificial leg which Mr. Wilson makes is intended for those who have lost the leg at the usual place below the knee, where the weight of the body rests on the knee joint and upper part of the leg upon a soft stuffed cushion.

These legs have no flexion at the knee, and the hollow for receiving the thigh goes up near to the hip: it opens behind to admit the thigh; it is fixed with three straps and hooks, which last are not only stronger, but less bulky than buckles.

When a limb is amputated above the knee, a joint is formed in the artificial leg at the knee. In walking, the limb is made steady by a steel bolt running in two staples on the outside of the thigh, being pushed down; and when the patient sits down, he renders the joint flexible by pulling the bolt up. This is easily

done, and it adds much to the utility of the invention.

The rest or support in this leg is obtained in part from its embracing the upper part of the thigh tightly, but chiefly from the back part of the thigh box being stuffed in such a manner that the lower part of the hip rests upon it with nearly the same ease that one does in sitting on a stuffed chair; and, in fact, a person sits on it when he either stands or walks; by which, and by the strap carried up from the sole of the foot to the shoulder, the limb is easily carried about.

Mr. Wilson's artificial arms, besides being made of firm hardened leather, are covered with white lamb-skin, so tinged as to resemble the human skin. The nails are made of white horn, tinged in such a manner as to be an exact imitation of nature.

The wrist joint is a ball and socket, and answers all the purposes of flexion, extension and rotation. The first joints of the thumb and fingers are also balls and sockets made of hammered plate brass, and all the balls are hollow to diminish their weight. The second and third joints are somewhat similar to that which anatomists term *ginglimus*, but they are so far different as to admit of any motion, whether flexion, extension, or lateral.

The fingers and metacarpus are made up to the shape, with soft shamoy leather and baked hair. In the palm of the hand there is an iron screw, in which a screw nail is occasionally fastened. The head of this nail is a spring plate, contrived in such a manner as to hold a knife or a fork, which it does with perfect firmness; and by means of a brass ring fixed on the first and second fingers, a pen can be used with sufficient exactness for writing.

When only a hand and fore-arm is needed, it is fixed to the arm above the elbow by a strap of leather sewed to one of the sides of the artificial forearm. After making a turn and a half just above the elbow,

the strap is fixed on the back part of the limb at D, figure 2.

When the arm is amputated above the elbow, the artificial limb is made with an elbow joint. This part of it is made of wood, and has a rotatory motion as well as that of flexion and extension.

I have given this particular account of Mr. Wilson's invention, from a conviction of its being superior to any with which the public is acquainted: I am also pleased at having it in my power to let the merit of such an artist be more generally known than it otherwise might be. Indeed his merit was so conspicuous, that his death I consider as a public loss, at the same time that I often wished that some public encouragement had been given him, to enable him to communicate as much as possible the result of his experience to others.

PLATE CI.

In this plate I have delineated two machines for supporting the head and shoulders, commonly employed in distortions of the spine.

Fig. 1. A, An iron collar properly covered for passing round the neck. By means of the long iron plate connected with it, it may be raised or depressed at pleasure. B B B, a broad iron plate fitted to the back and shoulders. C C, two straps to be carried over the shoulders; and being brought through beneath the armpits, to be fixed, of a sufficient tightness, on two knobs on the shoulder-plates, as may be seen in fig. 2. D, a strap for fixing the plate going down the back, by tying it round the body.

Fig. 3. an iron or steel instrument, delineated by Heister for the same purpose with the preceding. A A, its transverse part, to which are fastened iron rings C C for retaining and keeping back the shoulders. B, the perpendicular part going down the back. D, a band or ligature passing through an aperture in the lower end of the plate B for tying it firmly to the body.

PLATE CII.

In this and the four following plates, I have delineated the instruments employed in midwifery.

The forceps is perhaps the best, as it is the safest instrument employed by the accoucheur.

Various forms of it have been recommended by practitioners; but the one delineated in this plate has been found to answer perhaps better than any other. It is sufficiently long, and the blades apply with perfect exactness to the child's head.

This instrument should measure eleven or twelve inches in length. Some have alleged that they should be longer, in order to prevent their locking within the vagina, and that they may with more ease be applied when the head of the child lies high in the pelvis; but the length I have mentioned is by experience found to be sufficient.

PLATE CIII.

Fig. 1. Scissars used for perforating the skull of the foetus where the pelvis is so narrow that delivery cannot be otherwise accomplished. After emptying the cranium of its contents, the child is extracted piecemeal either with the crotchet or blunt hook, fig. 2. Plate CIV. or with the forceps, figures 1. or 3. of the same plate.

The scissars here represented are those recommended by Dr. Denman.

Fig. 2. A single blade of the common crotchet, an instrument employed for tearing away the foetus piecemeal when it cannot be delivered entire. From the form of this instrument, it obviously cannot be used but with much risk even of hurting the mother. The best rule for preventing this is to keep the point always towards the foetus.

Fig. 3. The two blades of the crotchet locked together; in which way they may be used with perfect safety to the mother.

PLATE CIV.

The forceps, figures 1. and 3. as well as the blunt hook, figure 2. of this plate, are intended, as was mentioned in the explanation of the preceding plate, for extracting the fœtus piecemeal, when it is judged necessary to accomplish delivery in this manner.

PLATE CV.

The instruments in this plate, and the fillet, fig. 3. in Plate CVI. are the invention of my friend the late Sir Thomas Bell, a practitioner of eminence in Dublin. They are chiefly intended for extracting the head of the fœtus, when by accident or improper management it is separated from the body in cases of narrow pelvis.

By a proper application of the fillet the head is steadily fixed till it is sufficiently opened for discharging the brain; when, with the forceps here delineated, the parts are extracted. These forceps consist of two blades; one nearly of the ordinary form; the other convex; and its convexity being adapted to the concavity of the other, the two occupy much less space than they otherwise would do; by which they are peculiarly well fitted for acting in a narrow pelvis. The teeth with which one of the blades is furnished, give these forceps a very firm hold of any part to which they are applied: and as they may be used with safety, I think it probable that in many cases they may supersede the use of the crotchet.

PLATE CVI.

Fig. 1. A fillet of whalebone covered with a sheath, which by some is employed, in difficult labours, for

pulling down the head of the foetus. In general, however, the forceps answer better.

Fig. 2. A curved instrument, with an opening at one end, for applying ligatures round polypous excrescences in the uterus. It is the invention of the late Dr. Hunter of London, and it answers the purpose in the easiest and most effectual manner.

Fig. 3. A fillet mentioned in the explanation of the preceding plate as the invention of Sir Thomas Bell of Dublin: it is a material improvement of the common fillet represented in figure 1. of this plate.

PLATE CVII.

Fig. 1. I have here delineated a night cap, fixed in such a manner as to serve as one of the best bandages for the head.

Fig. 2. The common triangular napkin, or couvre chef of the French, usually employed as a bandage for the head.

Fig. 3. The radiated bandage, as it is usually termed. It is commonly employed for compressing the temporal artery; and it answers equally well for stopping hemorrhagies in any arteries of the head, as may be seen in fig. 4. where the knot or turn is made at the angle of the jaw.

Fig. 5. The bandage usually employed for fractures of the lower jaw, as well as for wounds and other injuries of the under lip and chin.

Fig. 6. A bandage for supporting the head. It is formed by a proper application of the double headed roller, fig. 2. Plate CVIII.

PLATE CVIII.

Fig. 1. A common single headed roller; a bandage that answers for various purposes in surgery.

Fig. 2. A double headed roller.

Fig. 3. A double headed roller with a slit in the middle, forming what is termed the uniting bandage.

Fig. 4. A four headed roller, usually employed for fractures of the lower jaw and injuries of the contiguous parts.

Fig. 5. A bandage with twelve heads or tails applied to a leg. This, as I have had occasion to observe in various parts of this work, is the most useful bandage for fractures, as well as for many other affections of the thighs and legs. In fig. 7. I have represented a bandage of the same kind, made in a manner commonly used in some of the London hospitals.

Fig. 6. The uniting bandage, fig. 3. applied to a wound in the arm.

PLATE CIX.

Figs. 1. and 2. A front and back view of the napkin and scapulary, the most useful bandage for almost every part of the thorax and abdomen.

Figs. 3. and 4. Different forms of the T bandage. This bandage proves particularly useful in diseases of the anus and perineum. D, a hole for admitting the penis. At E, that part of the bandage which passes between the legs is divided into two; one part of it passing on one side of the penis and scrotum, and the other on the opposite side.

PLATE CX.

In this plate I have delineated the different forms of suspensory bandages for the scrotum. They may be made either of linen, cotton, or flannel; but soft cotton answers best.

Each bandage consists of a circular A, which is fixed round the body above the bones of the pelvis, and a pouch or bag connected with this: the principal difference between them consists in the form of the pouch,

and in the manner by which it is fixed to the circular. In figs. 1. 2. 3. and 4. the pouch is connected with the circular both before and behind. Of these, fig. 3. I think is the best.

Where the scrotum is of such a size, that the pouch or bag, when fixed upon it, will remain, the two bands, which pass between the thighs for fixing it behind, are unnecessary: fig. 5. represents a form of it for this purpose.

PLATES CXI. and CXII.

In these two plates I have delineated instruments for a pocket case, for which surgeons have daily occasion.

Plate CXI. fig. 1. forceps. Fig. 2. a round edged scalpel. Fig. 3. crooked scissors. Fig. 4. a case for caustic and red precipitate.

Plate CXII. figs. 1. and 3. different forms of probes. Fig. 2. a spatula. Fig. 4. a director.

These with a probe pointed bistoury, fig. 2. Plate LXIV. a tenaculum, Plate III. fig. 1. and 8. a scarificator, Plate XXXVI. fig. 4. and a few crooked needles of different sizes, form a very complete set for a pocket case.

PLATE CXIII.

The figures of this plate represent a set of instruments for the cure of hydrocele with a seton described in Chap. XXIV. Volume III. pages 64, 65.

PLATE CXIV.

A tube of copper for conveying fumes of cinnabar to ulcers in the throat or nose: A B, a box of copper, containing a heater of iron of the same form, and nearly of the same size, but somewhat less, that it may be easily put in and taken out: on this piece of iron,

when red hot, the cinnabar is put, and the cover C D with the tube E F attached to it, being screwed upon the box A B, all the fumes must necessarily pass through F, by which they may with ease be conveyed to any particular spot.

In operating for the fistula in ano with a probe pointed bistoury, when the parts to be cut are thick, some difficulty is occasionally experienced in passing the knob of the instrument through them: this, as I have elsewhere observed, may, with due care and attention, be easily overcome; but some who are not in the frequent practice of this operation, may do it more readily with the instruments, figs. 2. and 3. of this Plate, a very neat invention for which I am informed we are indebted to the ingenious Mr. Cruickshank of London.

These figures are in every other respect the same, only the one is straight, and the other crooked; and fig. 2. gives a back view of the instrument; and fig. 3. a front view of it.

This instrument consists of three principal or material parts. The handle A B. A probe pointed bistoury, C D, and a sharp pointed bistoury, D E.

The sharp pointed bistoury is made to slide smoothly upon the other, to which it must apply so closely, that the point F, fig. 1. may not be felt as it moves along, and they are attached to each other by a screw nail at I, fig. 3. passing through the slit C in the blunt bistoury C D into the end of the sharp pointed bistoury at E.

In operating, the forefinger of the left hand is introduced into the anus. The instrument with the sharp pointed bistoury drawn back as in fig. 2. is then passed into the sinus till the blunt end of it D reaches the top of it, and is felt by the finger in the rectum: an opening is now to be made in the rectum with the sharp pointed bistoury, which is done by pressing it forward, by applying the forefinger of the right hand to the knob E. This being done, and we know that the

opening is completed by the finger in the rectum, the sharp pointed bistoury is again drawn back, when the probe pointed bistoury D, being passed into the opening newly made in the rectum, the operation is finished in the usual way, as is done with the common bistoury.

PLATE CXV.

The three first figures of this Plate represent an apparatus delineated by the late very ingenious Mr. John Hunter, for the application of caustic to strictures in the urethra.

Fig. 1. A straight silver canula, with a plug at the end of a silver wire projecting beyond the end of it, so as to form a round knob: at the other end of the wire, is a small port crayon, in which is represented a piece of caustic.

Figure 2. A flexible canula for applying caustic to strictures in the bend of the urethra. The wire, with the small port crayon, is pushed out beyond its end.

Fig. 3. A piece of silver wire, with the plug at the end, to be introduced into the canula, as in fig. 1.

In using these instruments, figure 1, or 2, with its projecting knob, is passed into the urethra till it comes in contact with the stricture, in which situation the tube is kept, and the wire being withdrawn, the port crayon, with caustic fixed in it, is passed through the tube, and kept applied to the stricture as long as may be judged proper, when, on being pulled into the tube, the whole is withdrawn. I have elsewhere, however, endeavoured to shew, that little advantage is to be expected from this instrument, while much harm may be done by it.* Where strictures are of the length of a third or fourth part of an inch, as they often are, I conceive it to be impossible to remove them

* Vide Treatise on Gonorrhœa Virulenta, and Lues Venerea, by Benjamin Bell.

with caustic, while there is always some risk, with whatever caution it may be managed, of the caustic breaking off and remaining in the urethra; as there also is, of our bringing the caustic into immediate contact with the sound part of the urethra, instead of applying it directly to the stricture itself.

Fig. 4. A straight silver canula, with a stilette, furnished with a sharp trocar point. Where strictures are not more extensive than the thickness of a sheet of paper or two, but yet too firm to be passed with a bougie or common staff, by passing the canula of this instrument till it comes in contact with the stricture, the stilette may then be easily pushed through it, when the whole being withdrawn, a bougie may be inserted, and the cure completed by a proper and continued use of bougies. By means of the small holes and screw nail near the handle of the stilette, the length of the pointed part of this instrument is easily graduated; but I need scarcely observe, that even with this it requires to be used with great caution, and ought not to be employed but by those who are much versant in the treatment of obstructions of the urethra.

The first part of the history of the
 world is the history of the
 creation of the world and the
 life of man in the garden of
 Eden. The second part is the
 history of the fall of man and
 the consequent curse upon the
 world. The third part is the
 history of the flood and the
 building of the ark. The fourth
 part is the history of the
 call of Abraham and the
 establishment of the Jewish
 nation. The fifth part is the
 history of the life of Jesus
 Christ and the establishment of
 the Christian church. The sixth
 part is the history of the
 apostles and the spread of the
 Christian faith. The seventh
 part is the history of the
 Roman Empire and the
 persecution of the Christians.
 The eighth part is the history
 of the life of the Virgin Mary
 and the birth of Jesus Christ.
 The ninth part is the history
 of the life of the infant Jesus
 and the flight into Egypt.
 The tenth part is the history
 of the life of the young Jesus
 and the beginning of his
 public ministry. The eleventh
 part is the history of the
 life of Jesus Christ from the
 beginning of his public ministry
 to the end of his life on earth.
 The twelfth part is the history
 of the resurrection of Jesus
 Christ and the ascension into
 heaven. The thirteenth part
 is the history of the descent
 of the Holy Spirit upon the
 apostles at Pentecost. The
 fourteenth part is the history
 of the life of the apostles and
 the spread of the Christian
 faith. The fifteenth part is
 the history of the life of the
 apostles and the spread of the
 Christian faith. The sixteenth
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PLATE I

Fig 1



Fig 2



Plate II

Fig. 1.

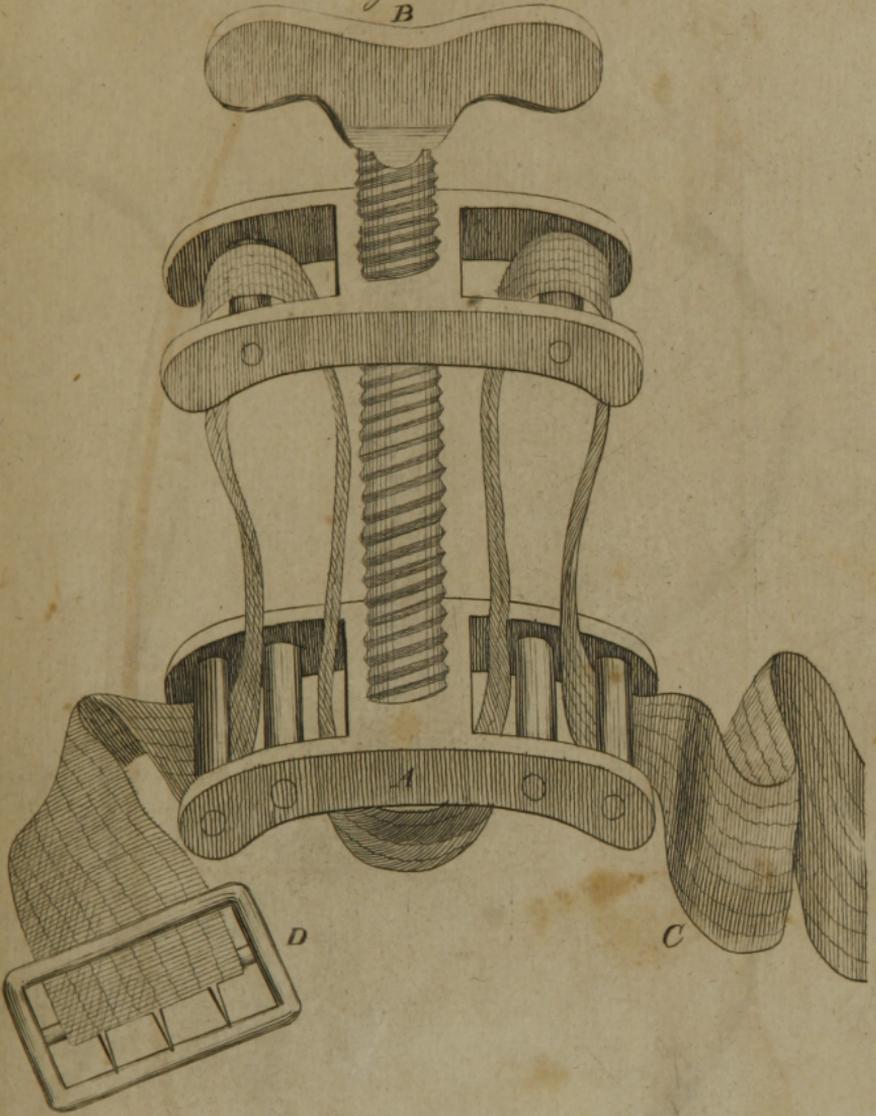
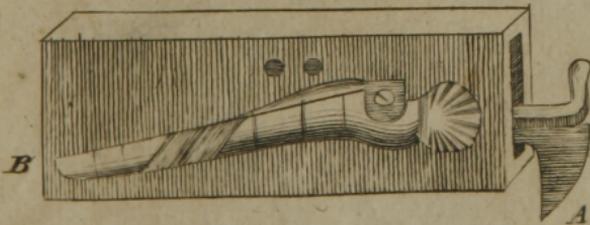


Fig. 2.



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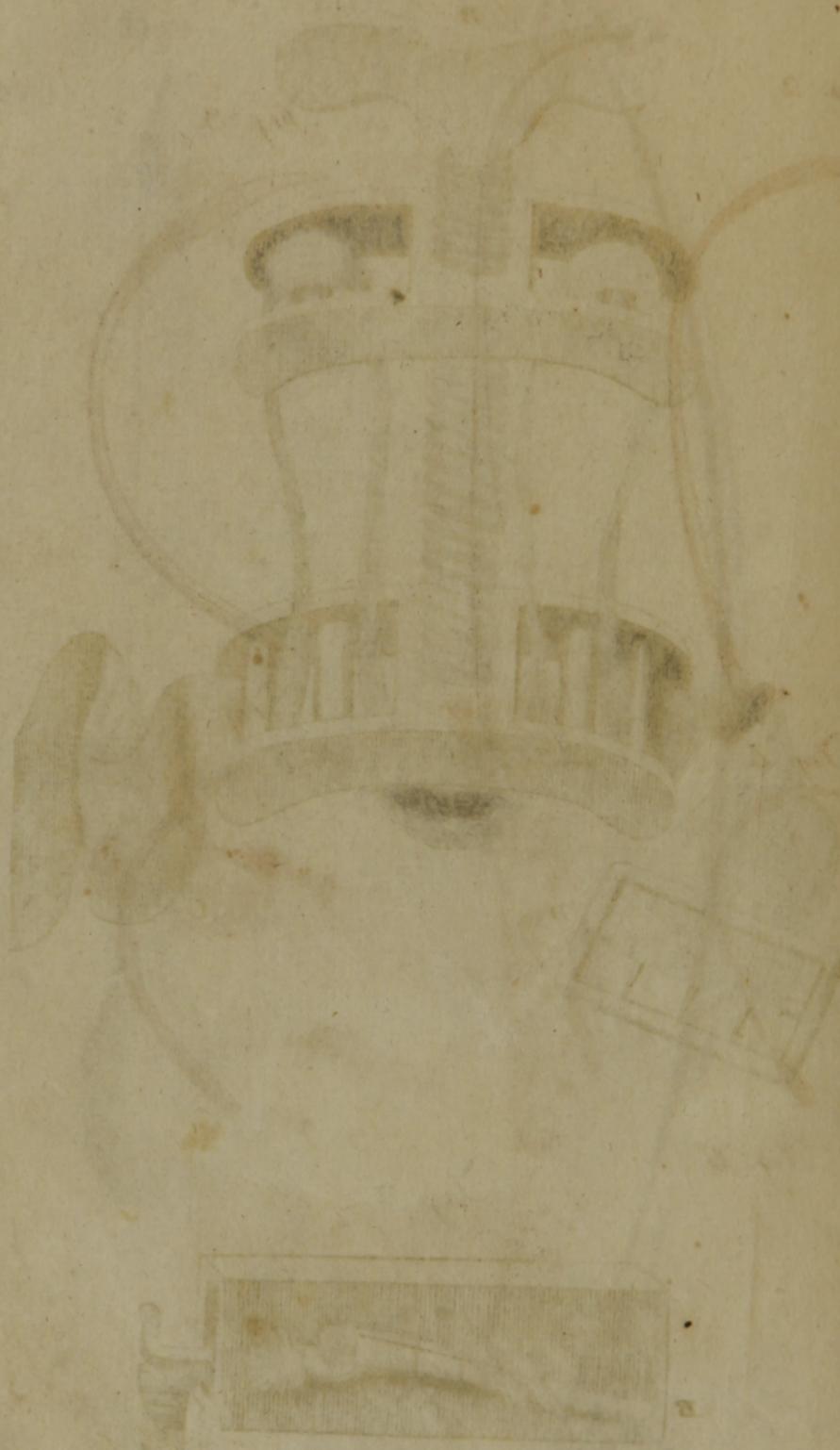


Plate III.

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



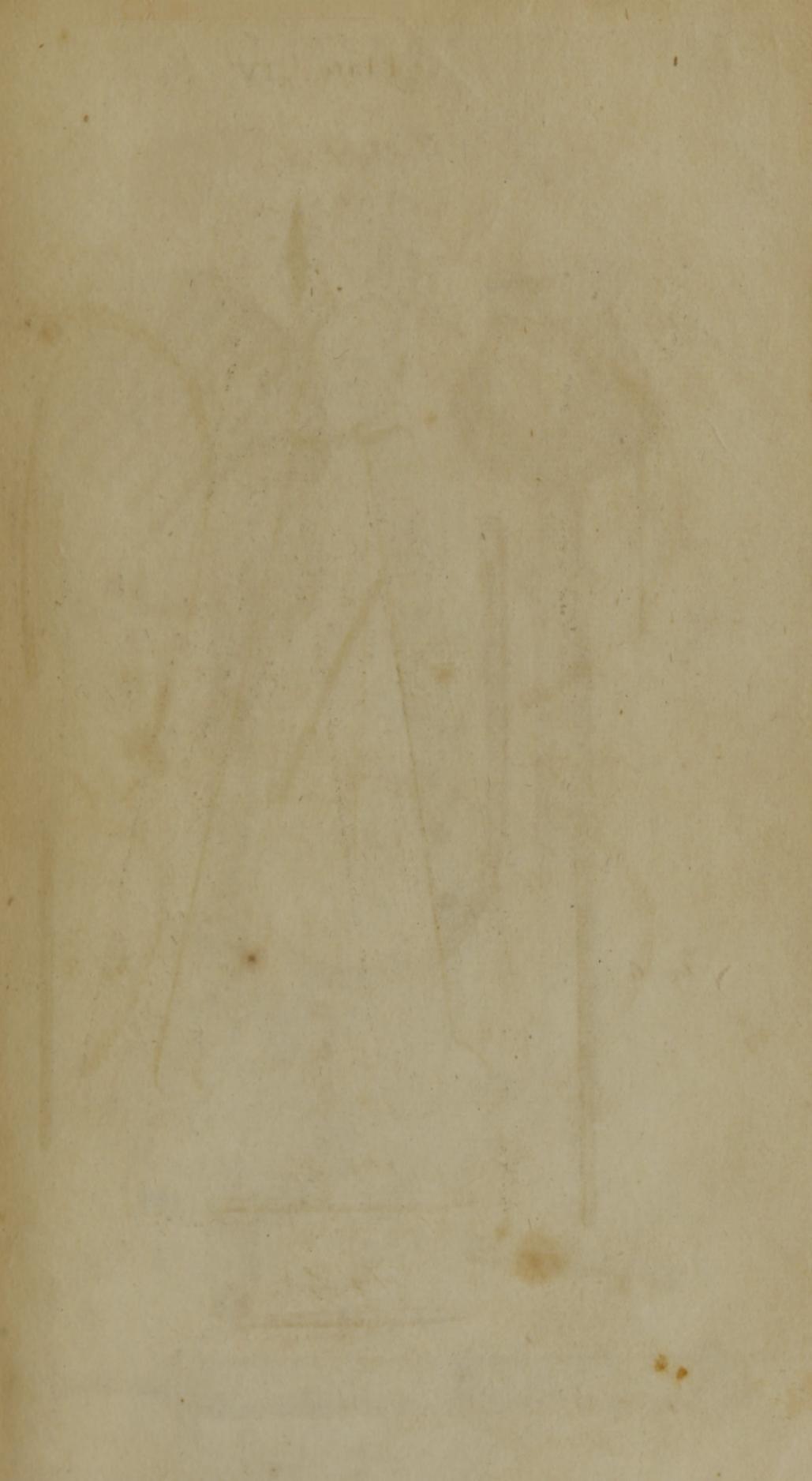


Plate IV

Fig. 1.



Fig. 2.



Fig. 5.



Fig. 7.



Fig. 6.



Fig. 8.



Fig. 3.



Fig. 4.



Plate V.

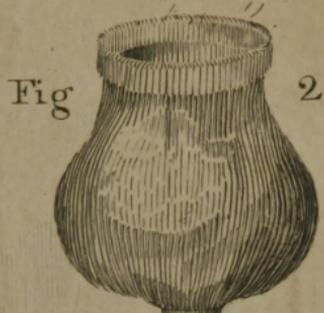
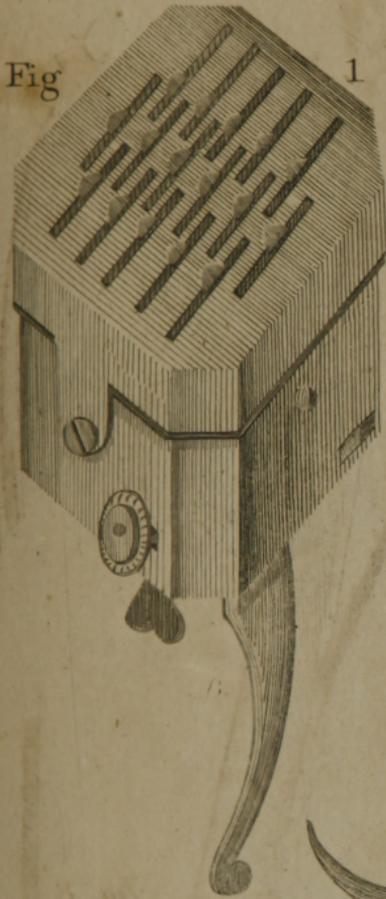
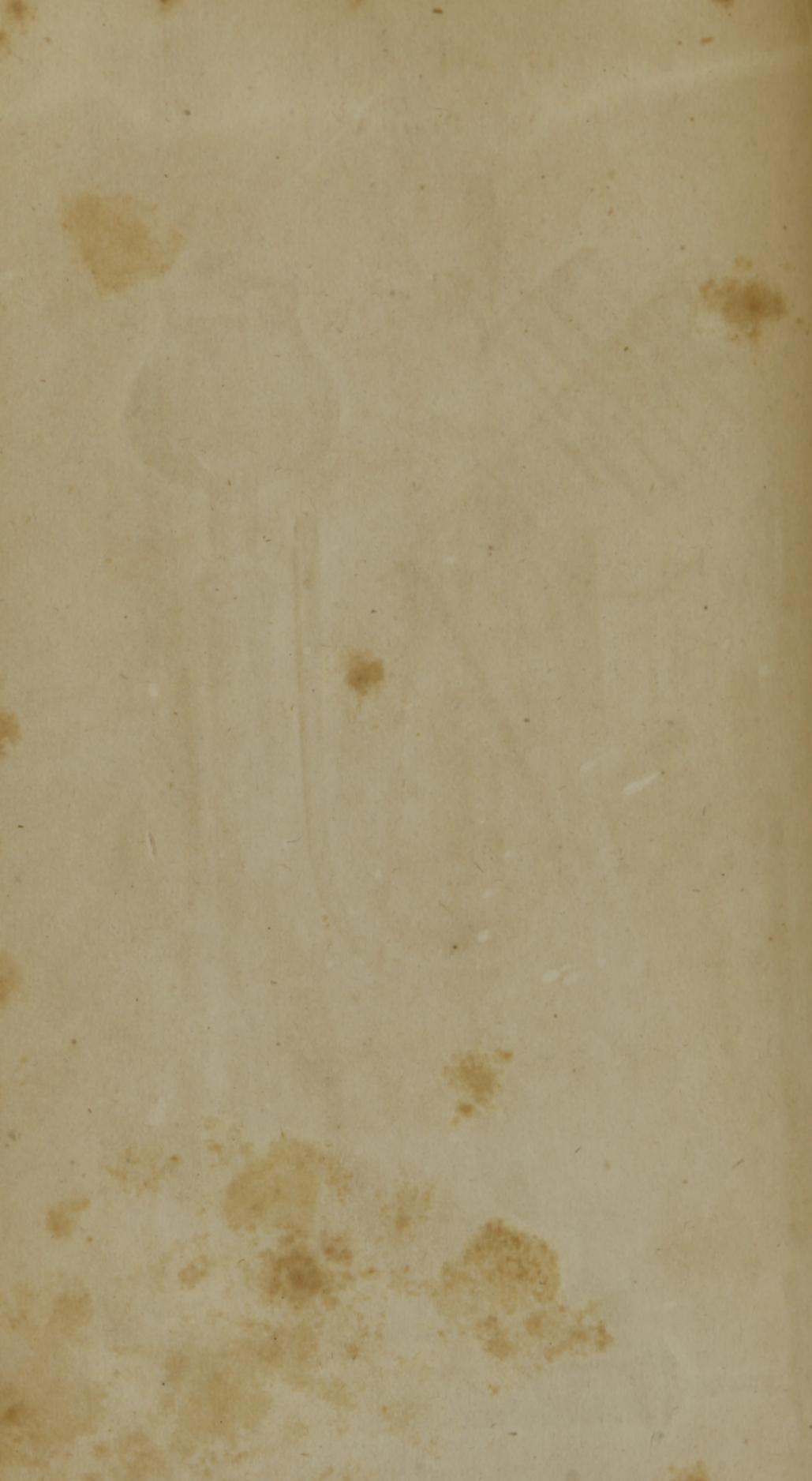


Fig. 5.



Fig 4





17. 11. 19

Fig. 4



Fig. 1



Fig. 2



Fig. 3



Fig. 5



PLATE 11

FIG. 1



PLATE VII

FIG. 1

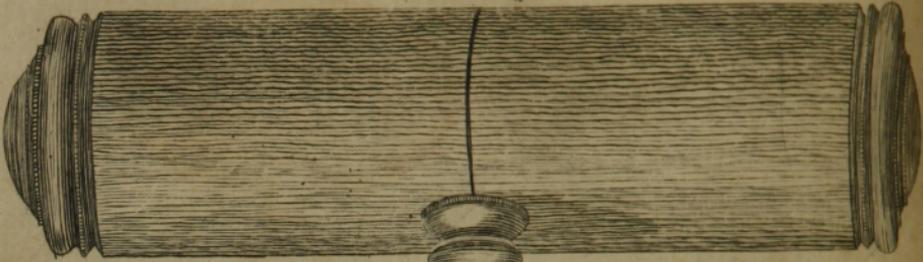


FIG. 2



FIG. 3

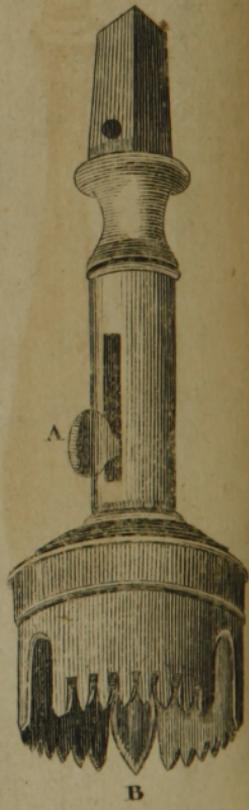


PLATE VIII

FIG. 2.



FIG.

1.



FIG. 3.







Fig. 1. *Fig. 2.*



Fig. 3.

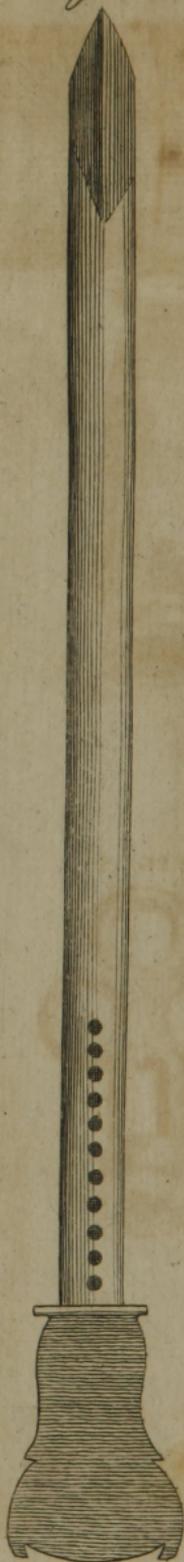


Fig. 4.

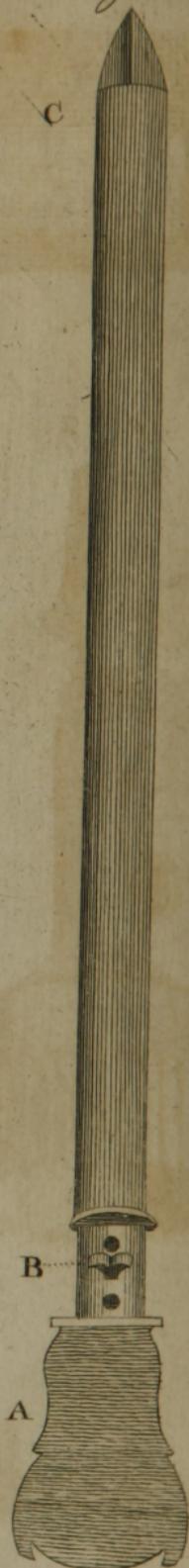


PLATE X

FIG. 1.

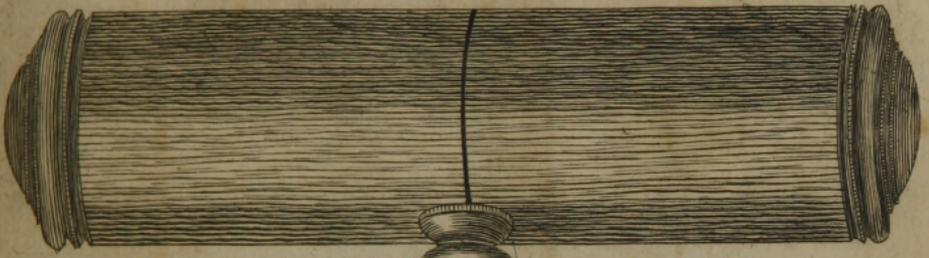


FIG. 2.

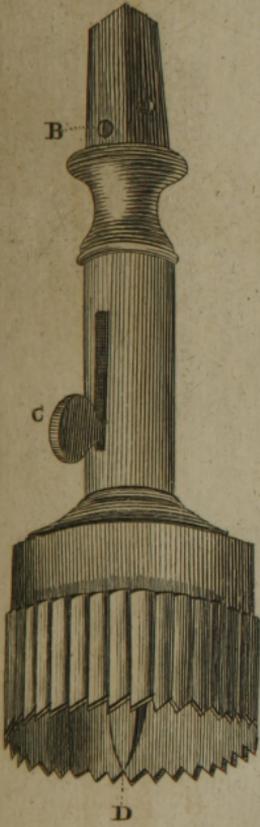


FIG. 3.

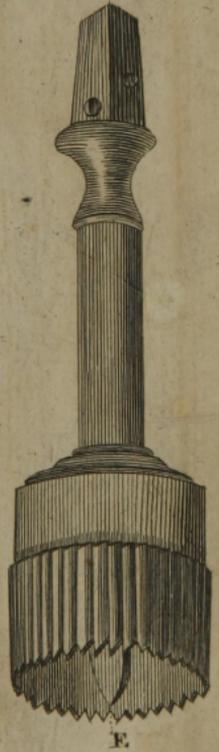


FIG. 4.



FIG. 5.



PLATE

FIG. 1



FIG. 2



FIG. 3



FIG. 4



FIG. 5



PLATE III



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



PLATE. XII.

FIG. 1.



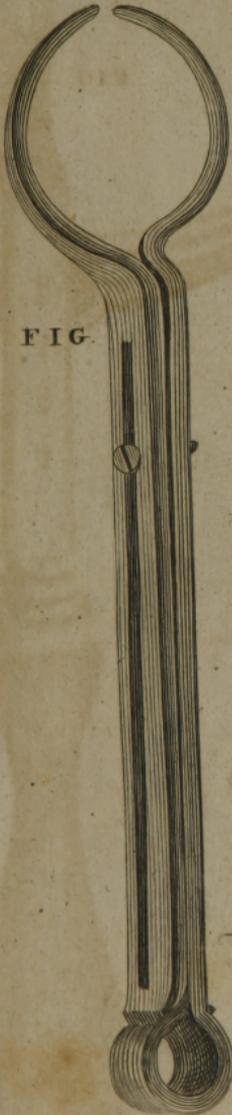
FIG. 2.



FIG. 4.



FIG. 3.





1791



PLATE XIII



FIG. 4.



PLATE XIV

FIG. 1.



FIG. 2.



FIG. 4.



FIG. 3.

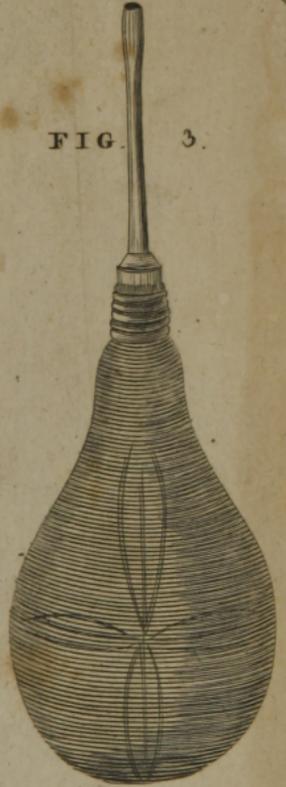


FIG. 5.



FIG. 6.







PLATE XV

FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



FIG. 5.



PLATE XVI

FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.







FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



PLATE XVIII

FIG. 1.



FIG. 2.



FIG. 3.

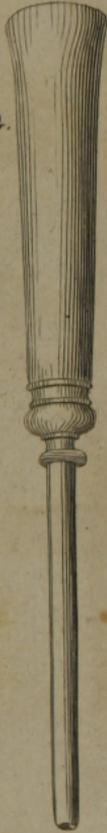


FIG. 4.



FIG. 5.

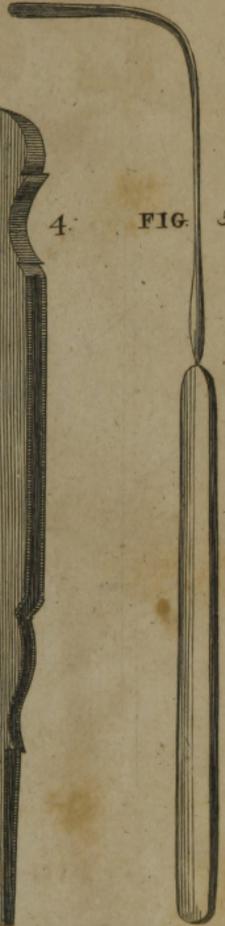
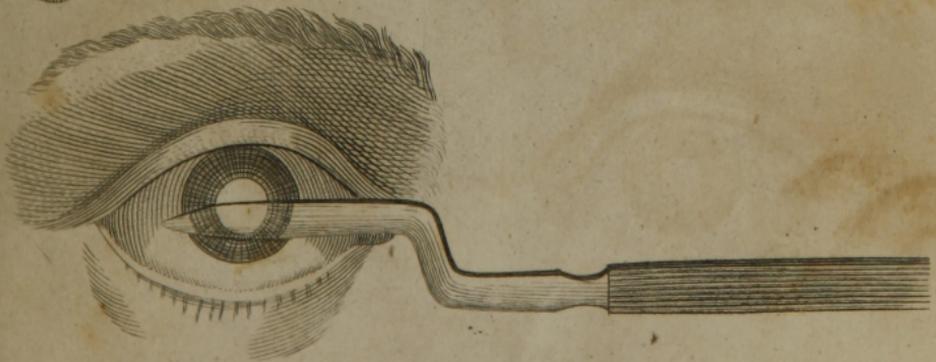
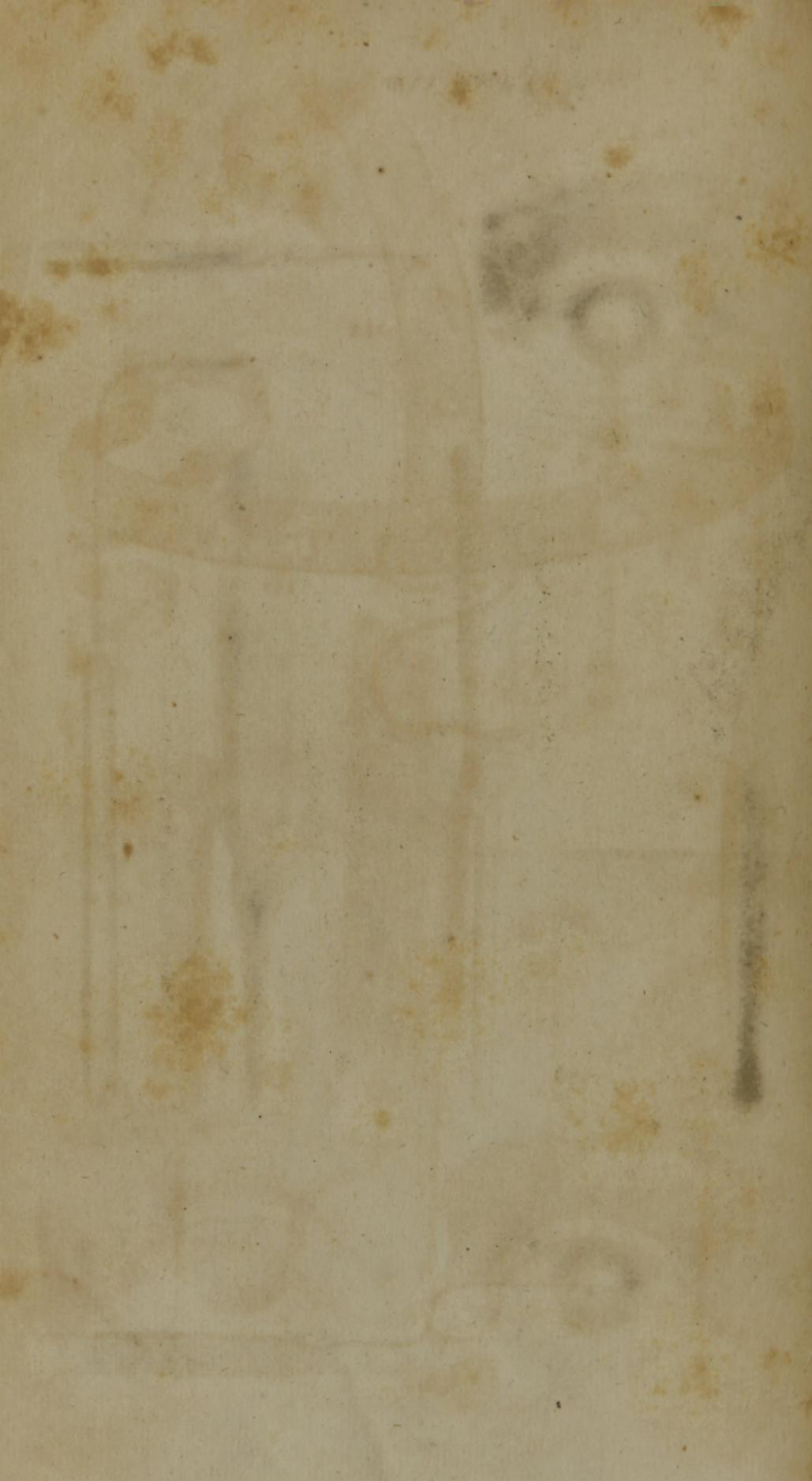
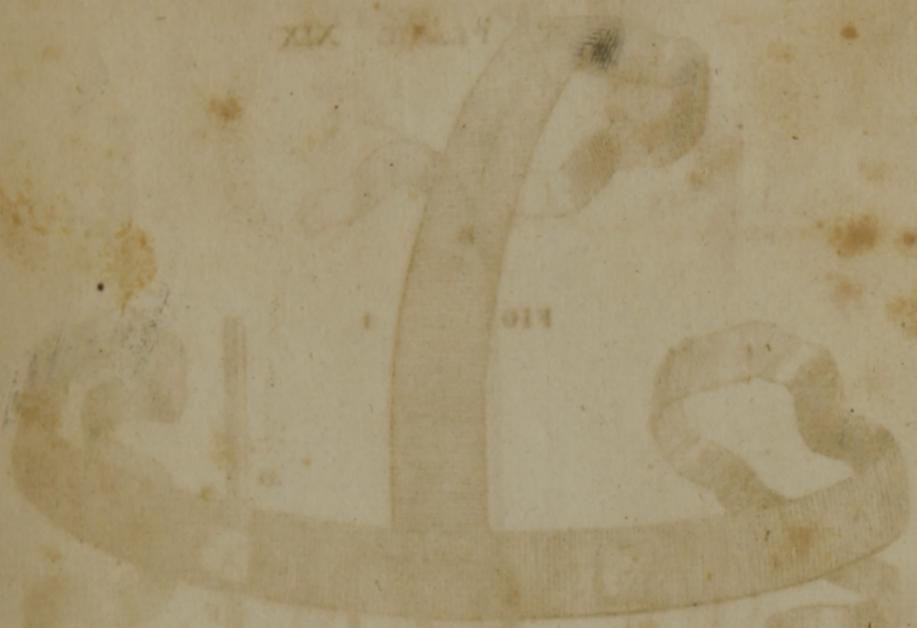


FIG. 6.





XIX



110



110

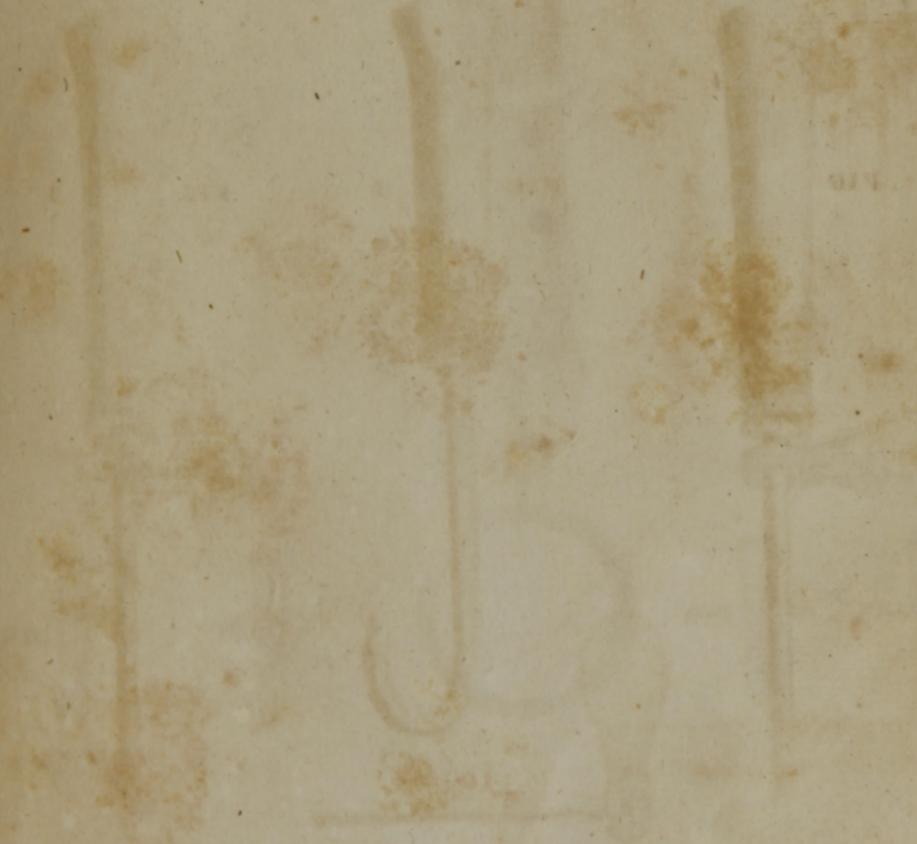


PLATE XIX

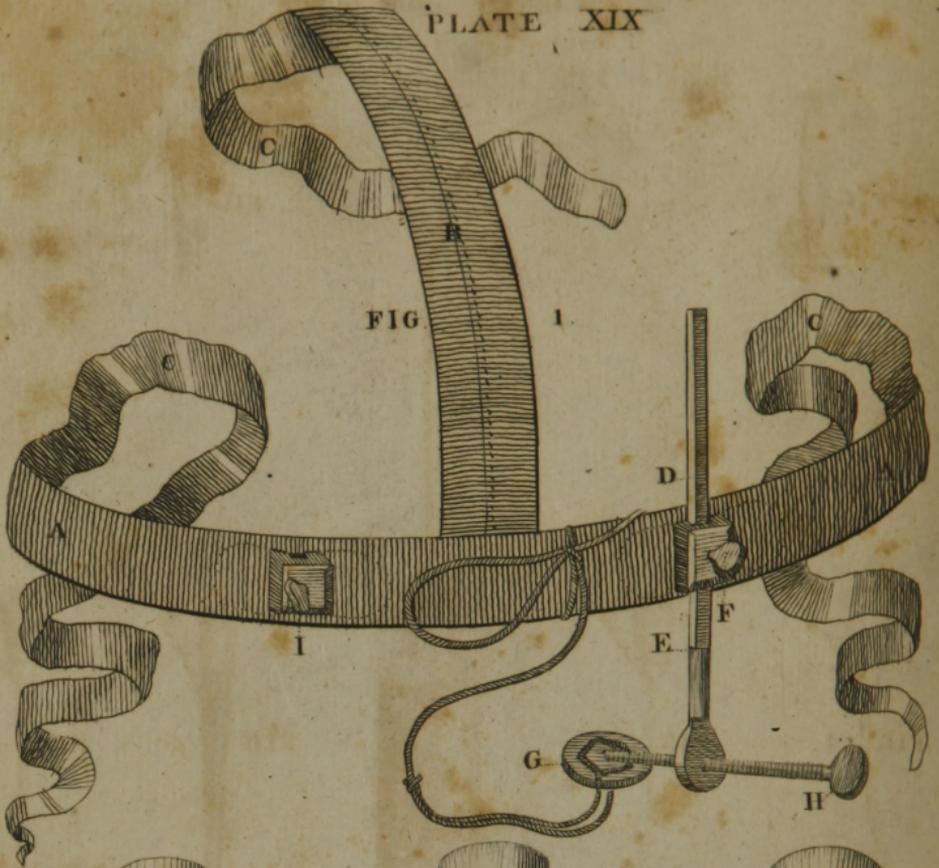


FIG.

2.



FIG.

5.



FIG.

3.



FIG. 4.



PLATE XX

FIG 1.

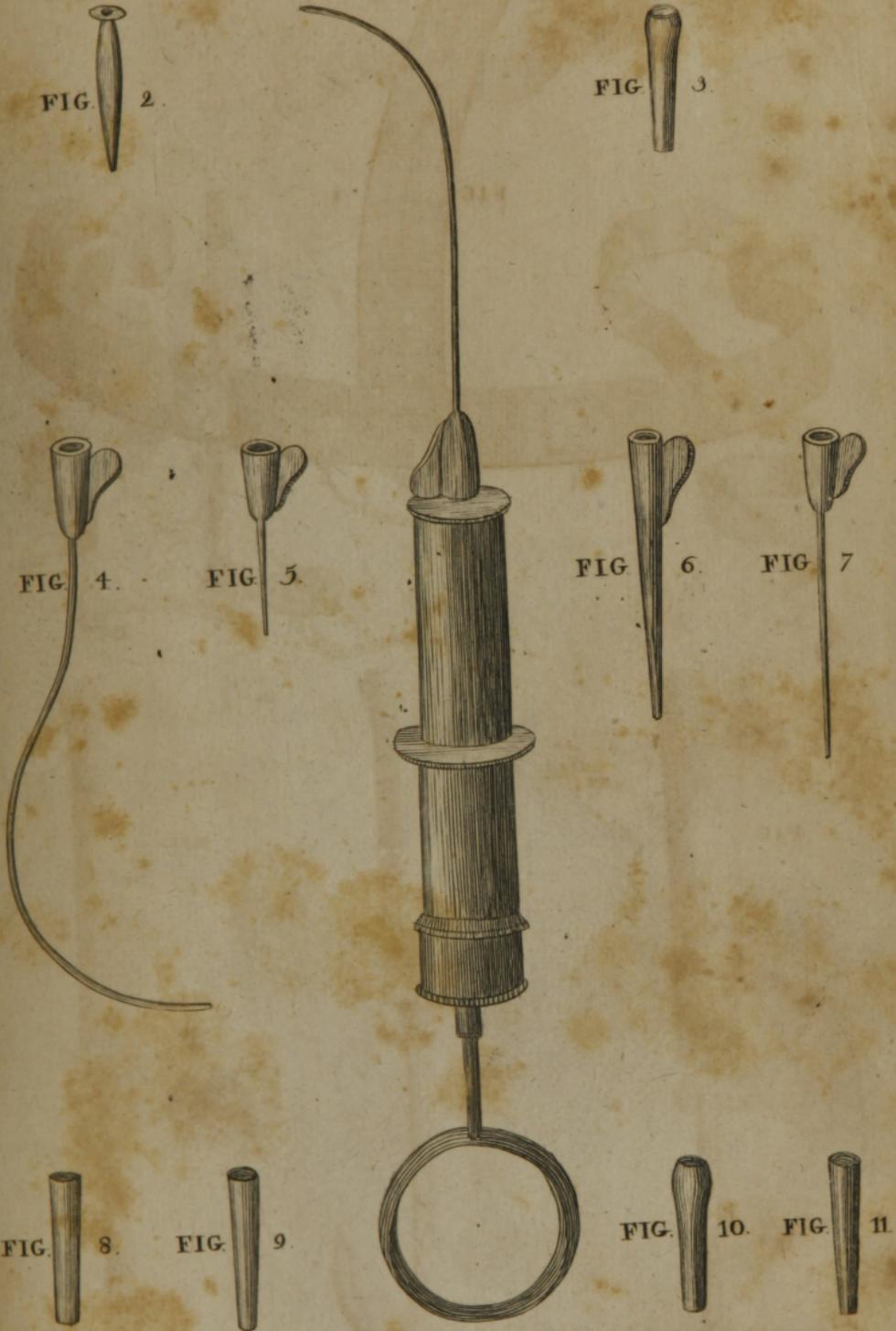






PLATE XXI

FIG. 1.

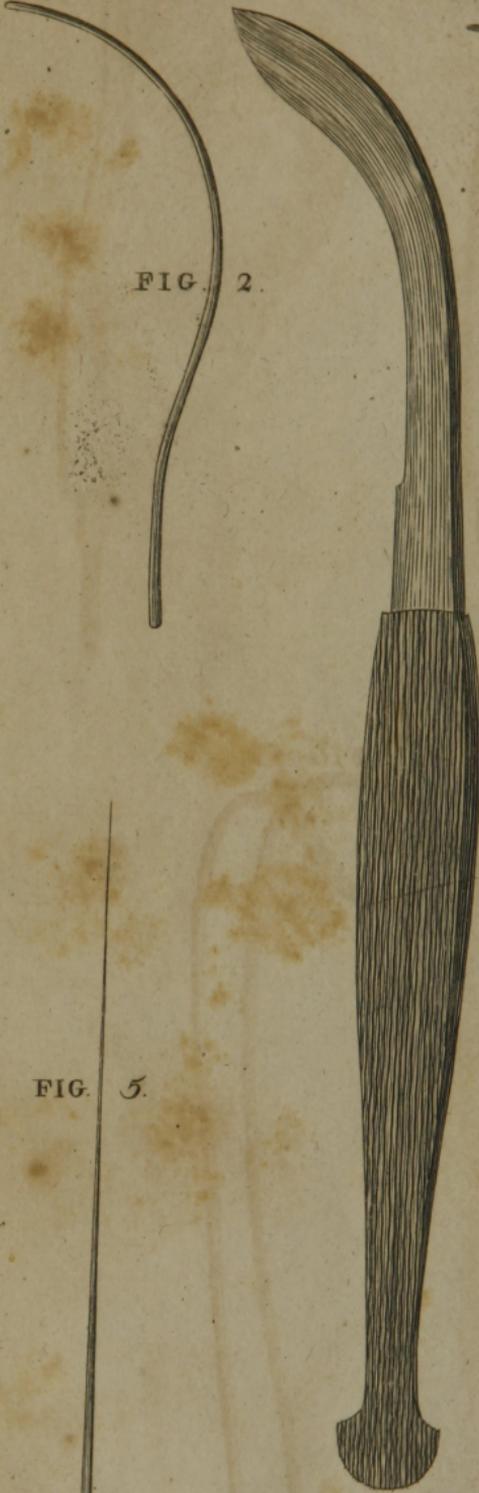


FIG. 2.

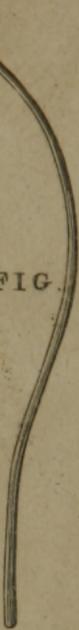


FIG. 3.



FIG.



FIG. 5.



FIG. 6.



FIG. 1.



FIG. 2.



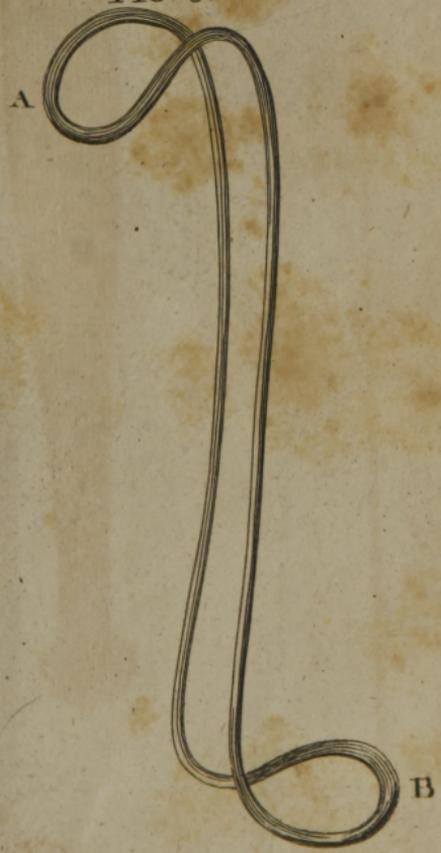
FIG. 3.



FIG. 4.



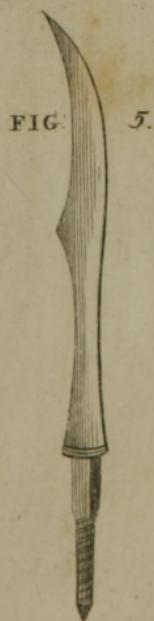
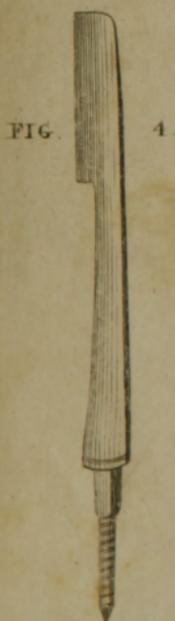
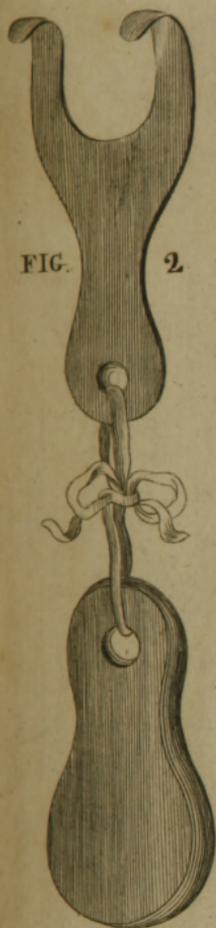
FIG. 5.



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PLATE XXIII



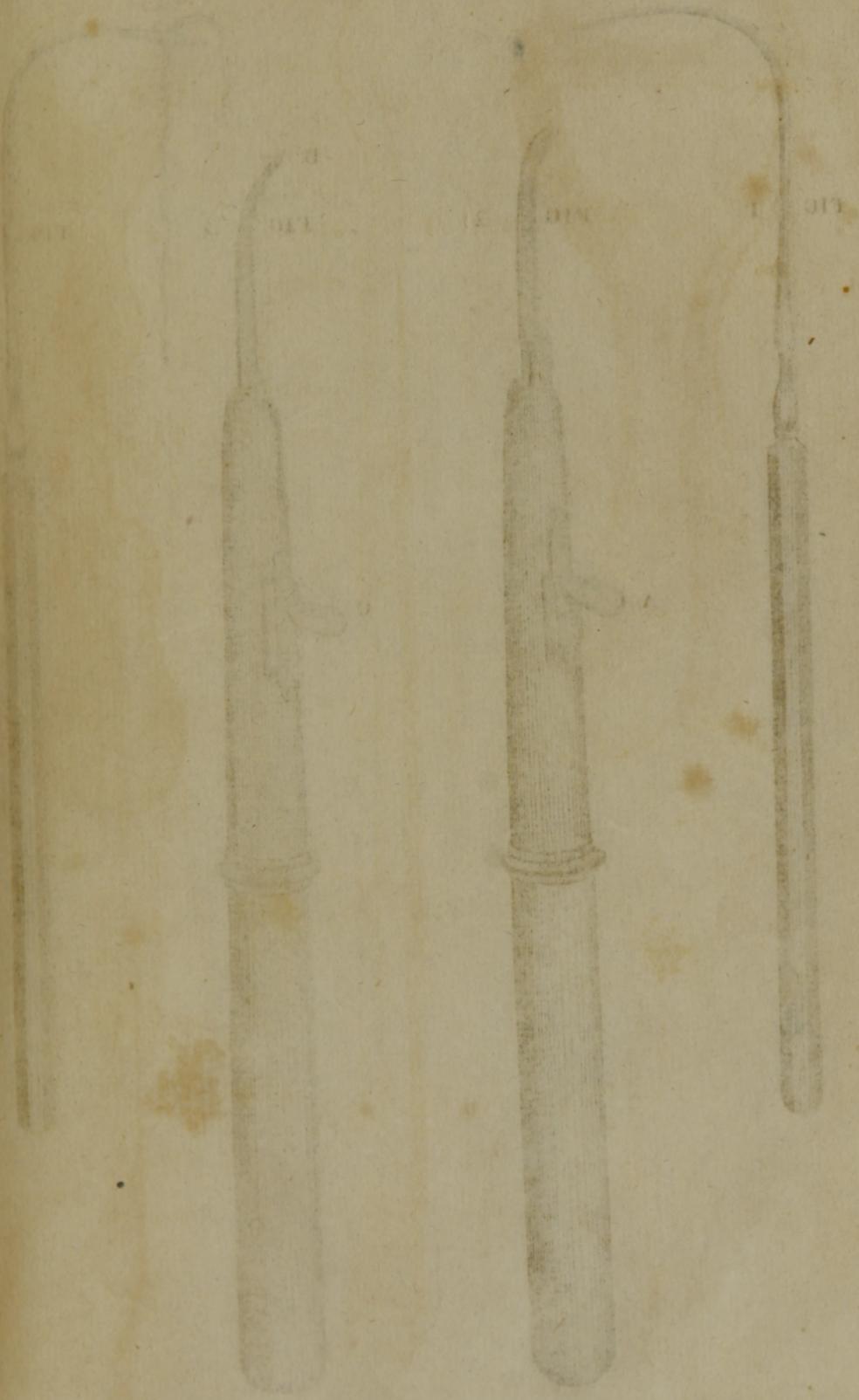
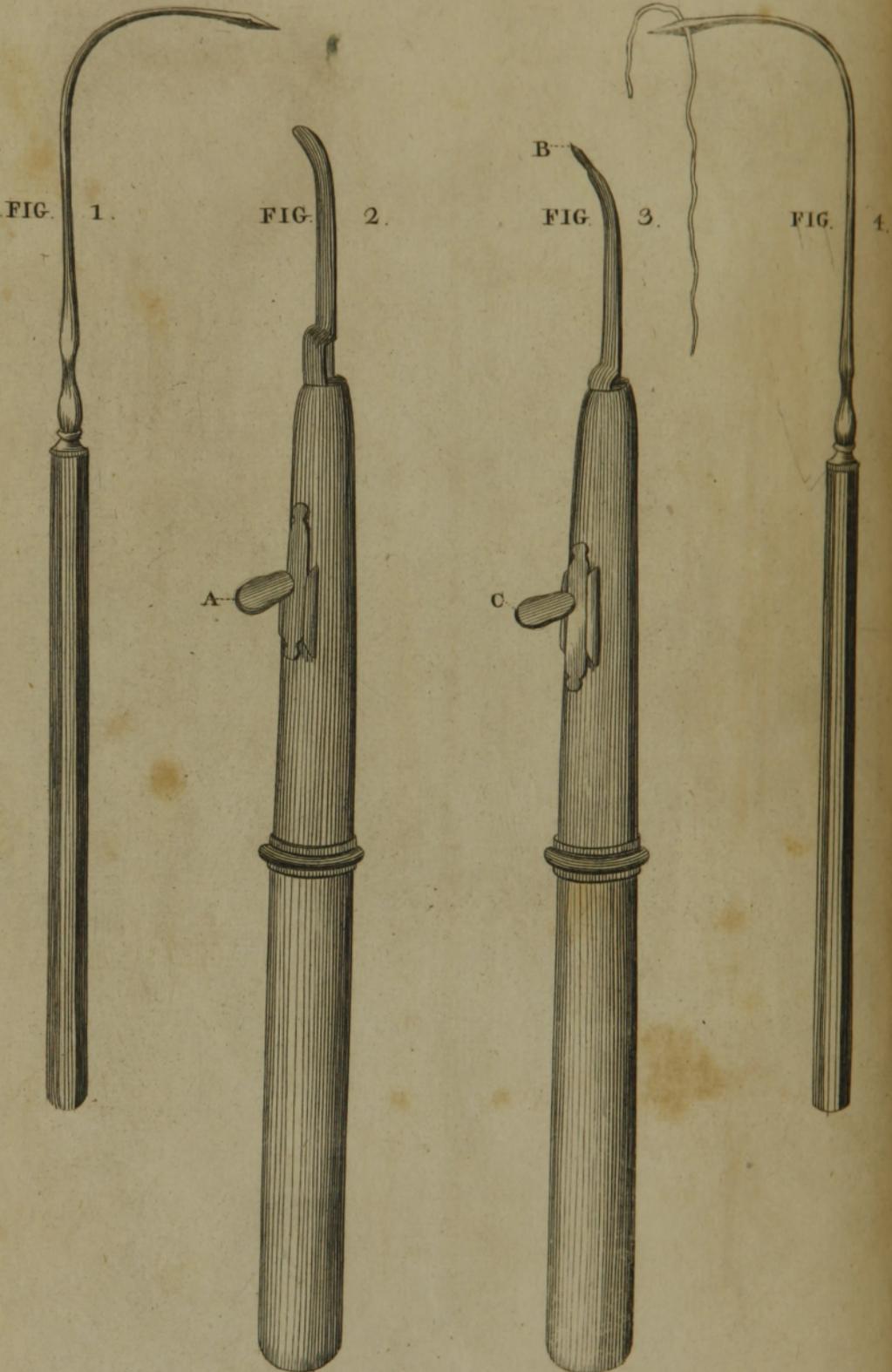
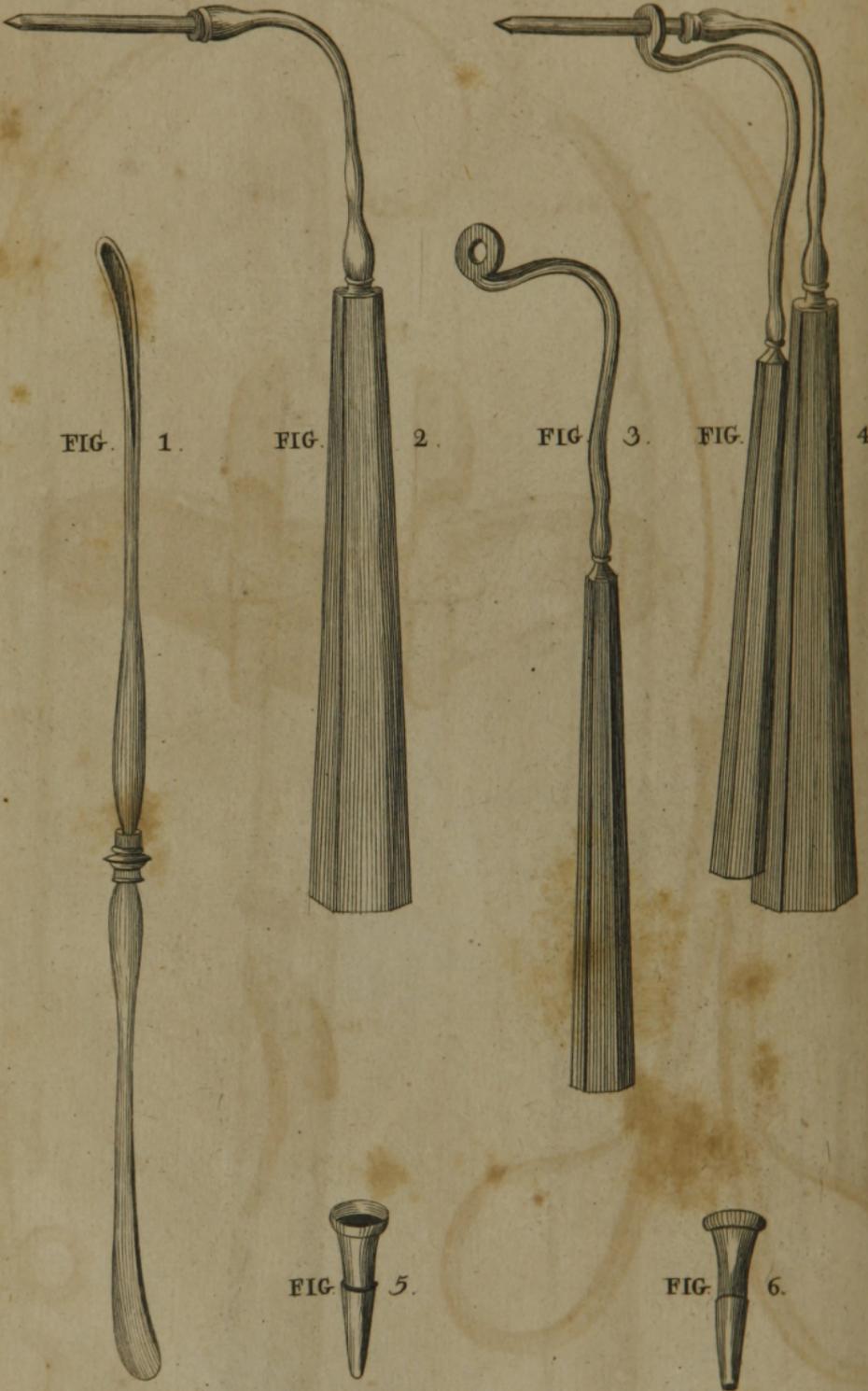


PLATE XXIV







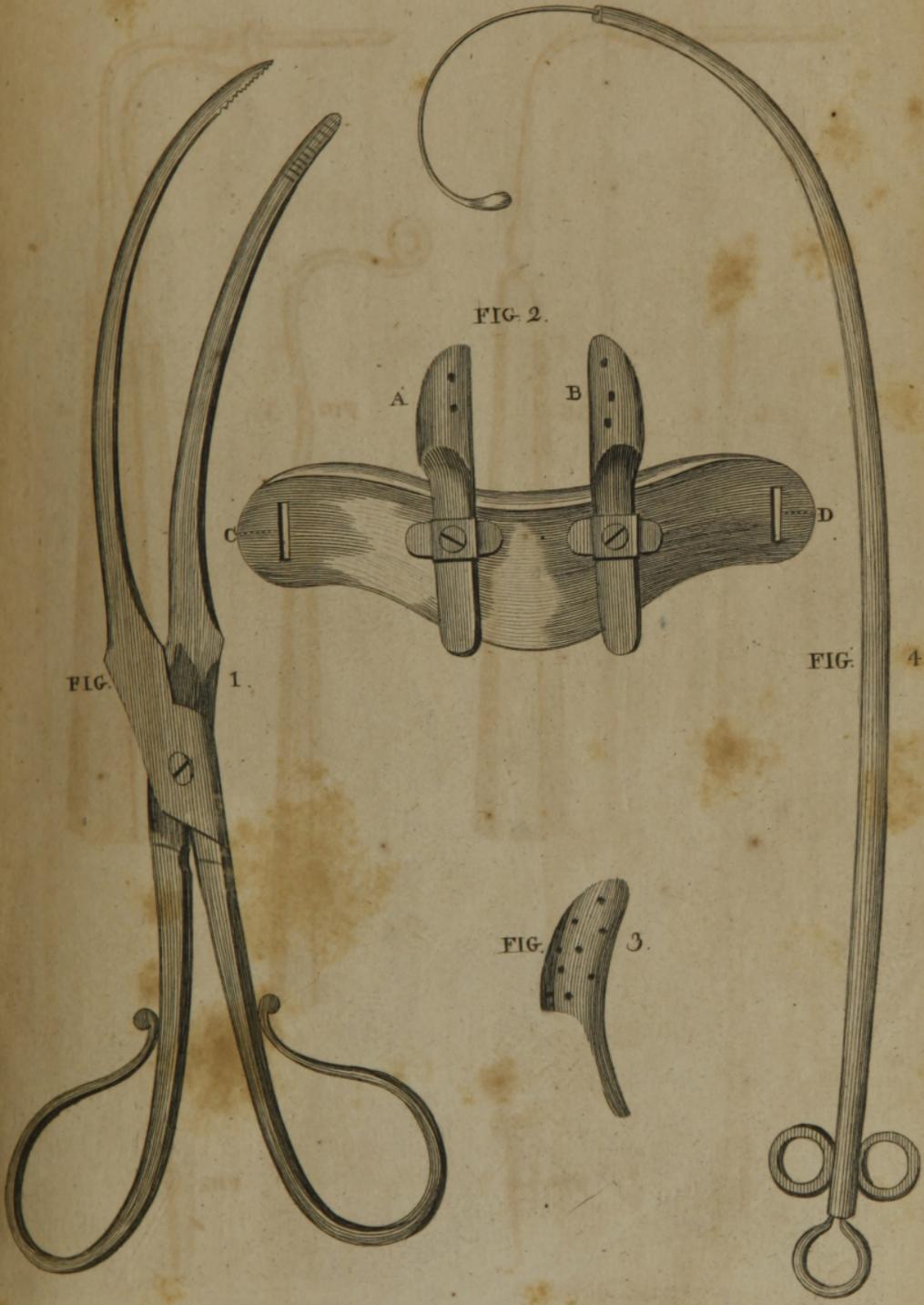


FIG.

1.

FIG. 2.

A

B

C

D

FIG.

4.

FIG.

3.





PLATE XXVII

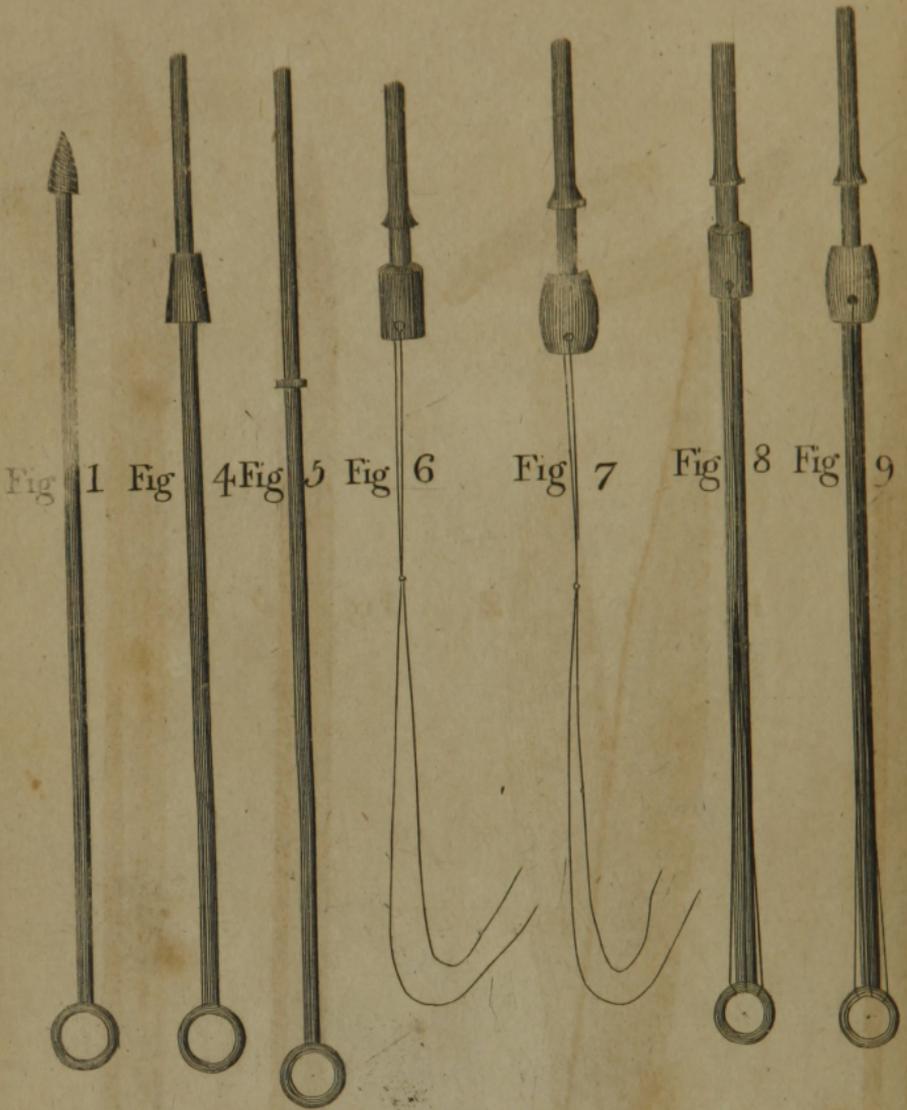
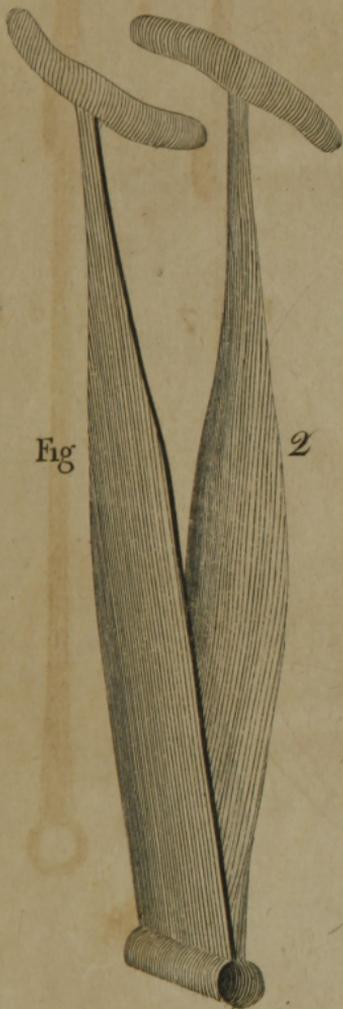


PLATE XXVIII



Fig

1



Fig

2



Fig

3



Fig

4

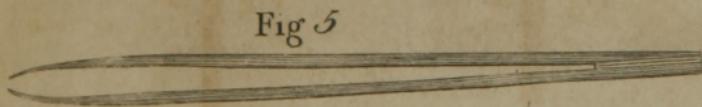
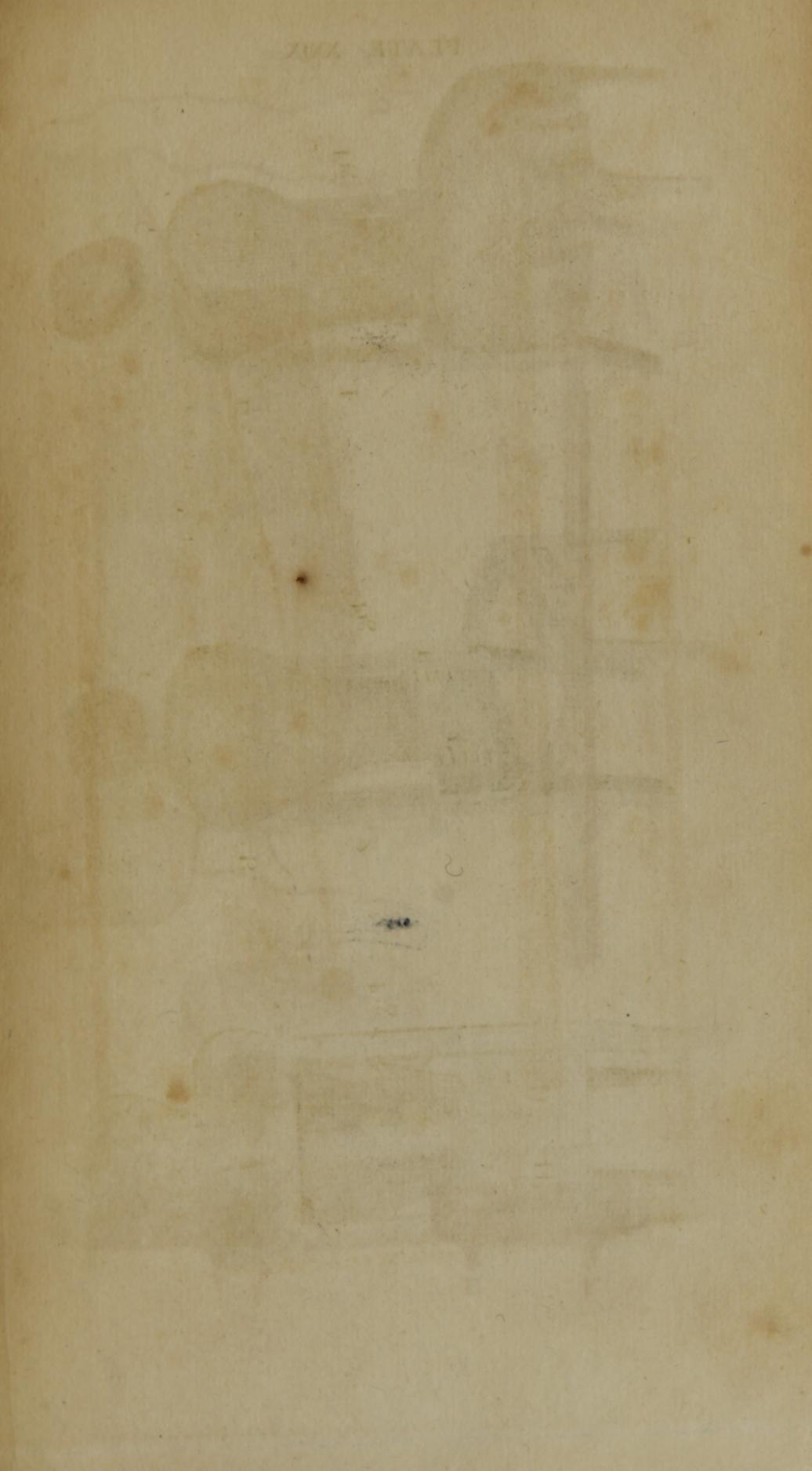


Fig 5



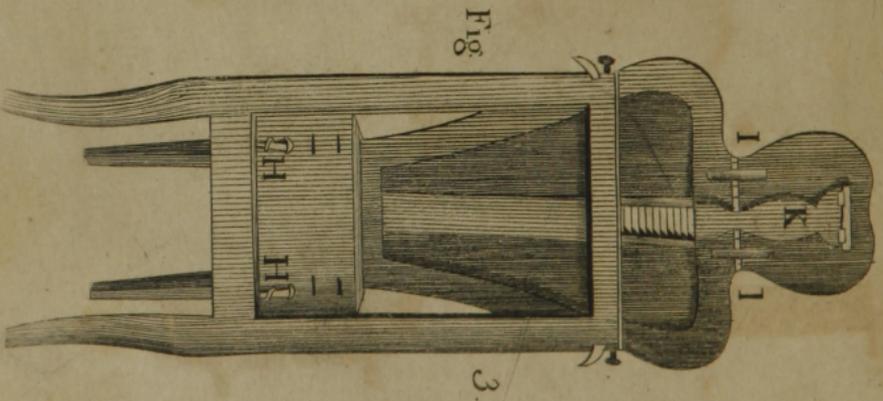
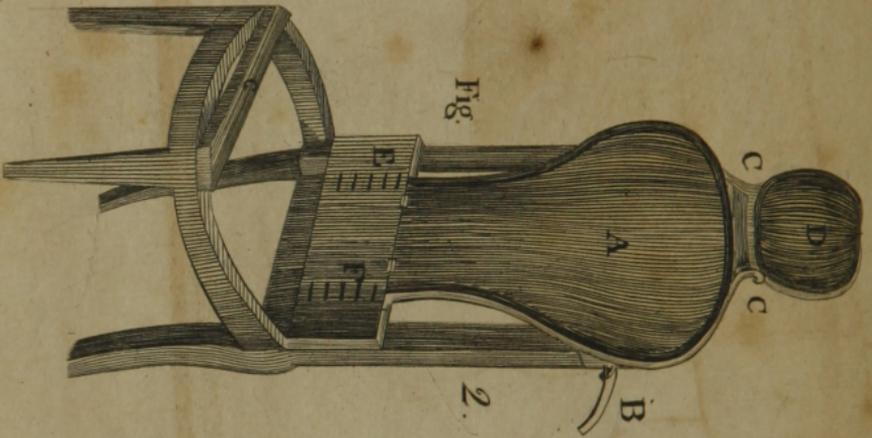
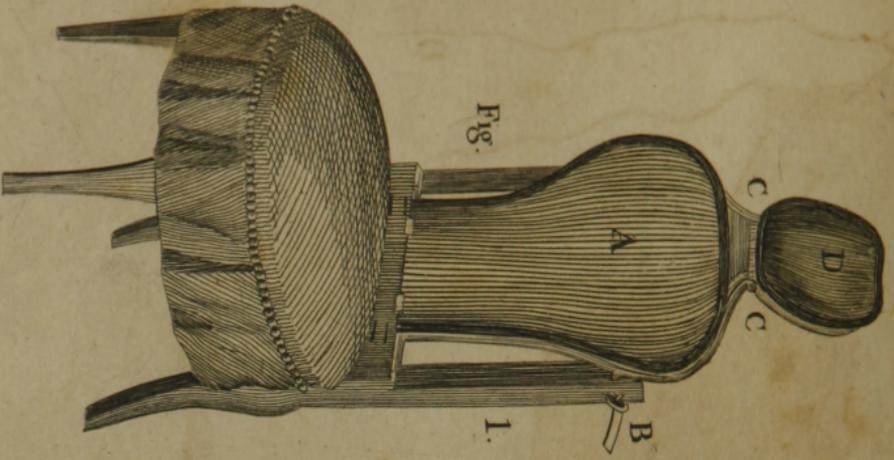




Fig 3

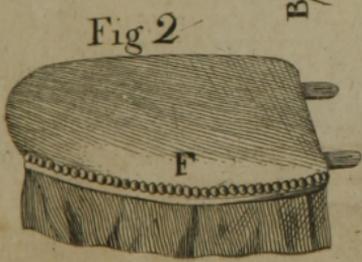


Fig 2



Fig

4

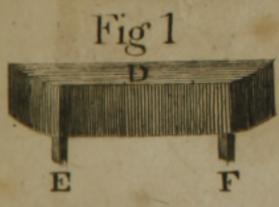


Fig 1

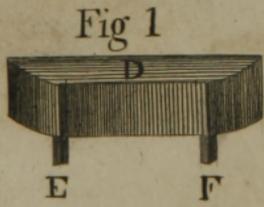
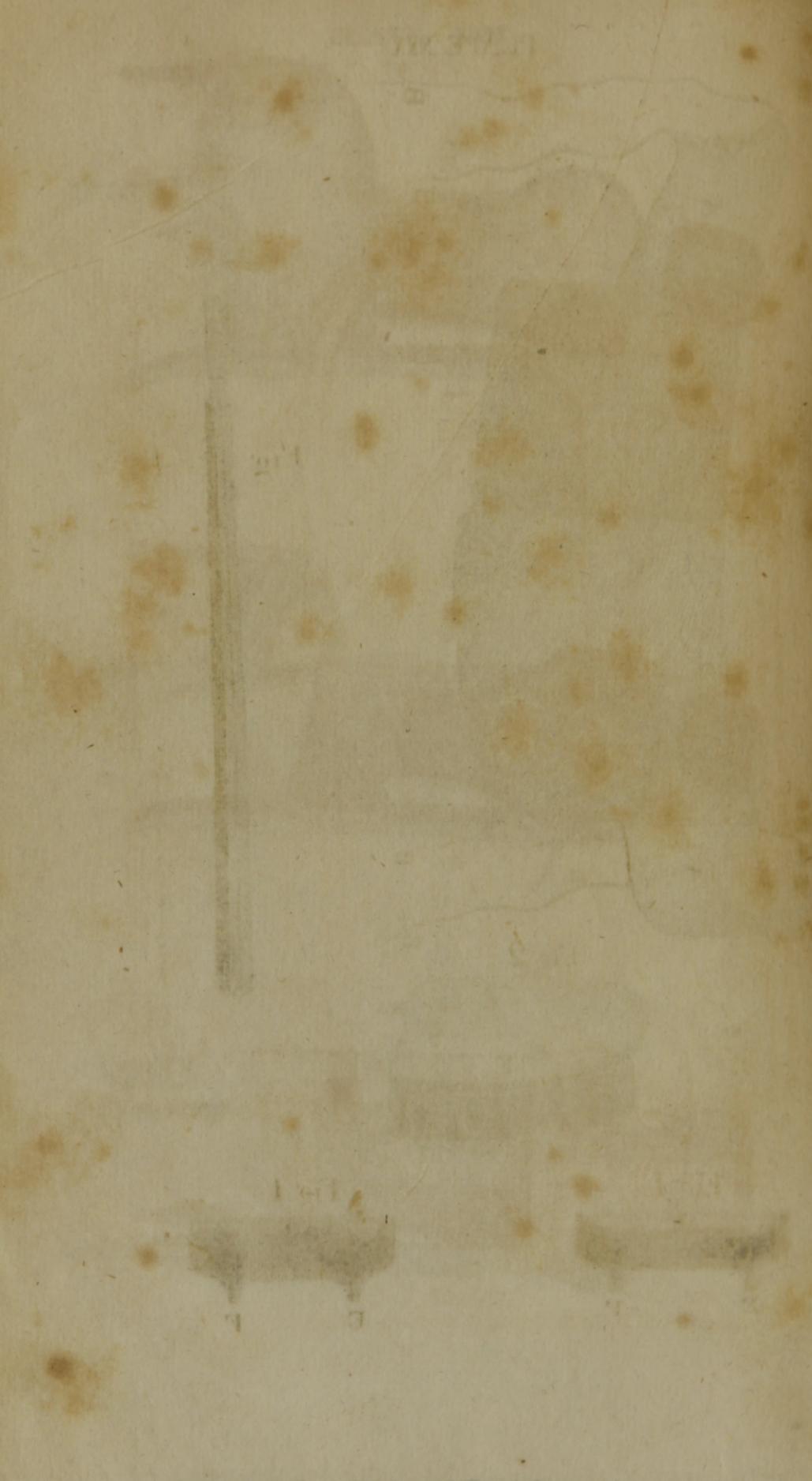


Fig 1





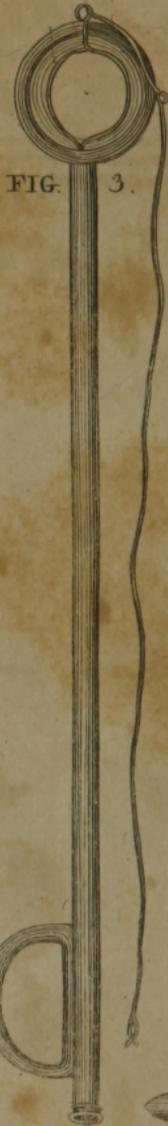


PLATE XXXII

FIG.

1.

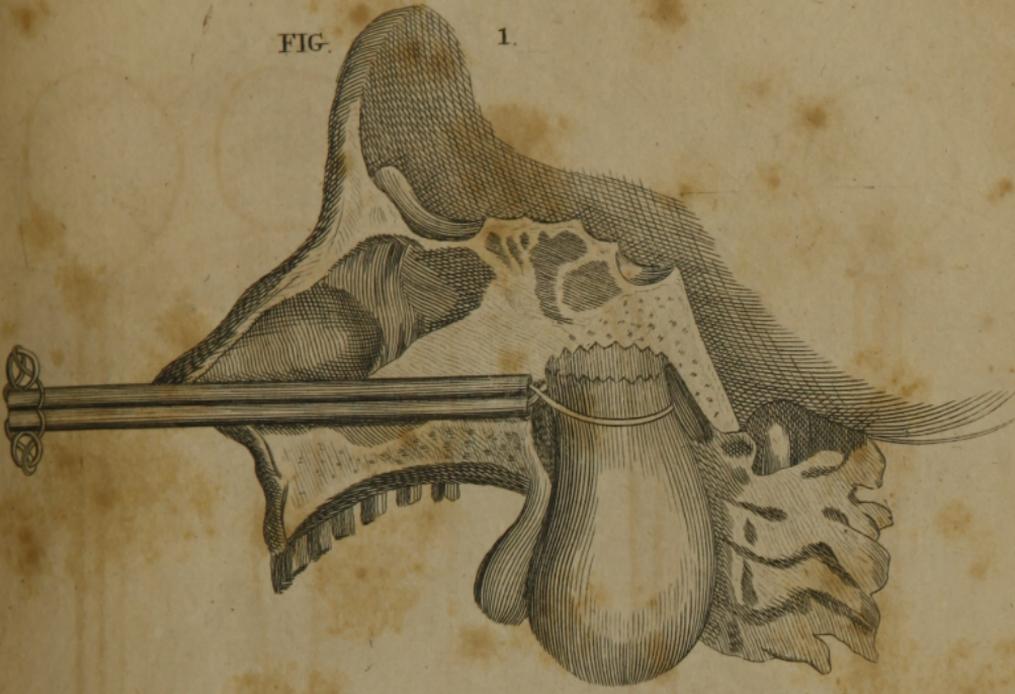
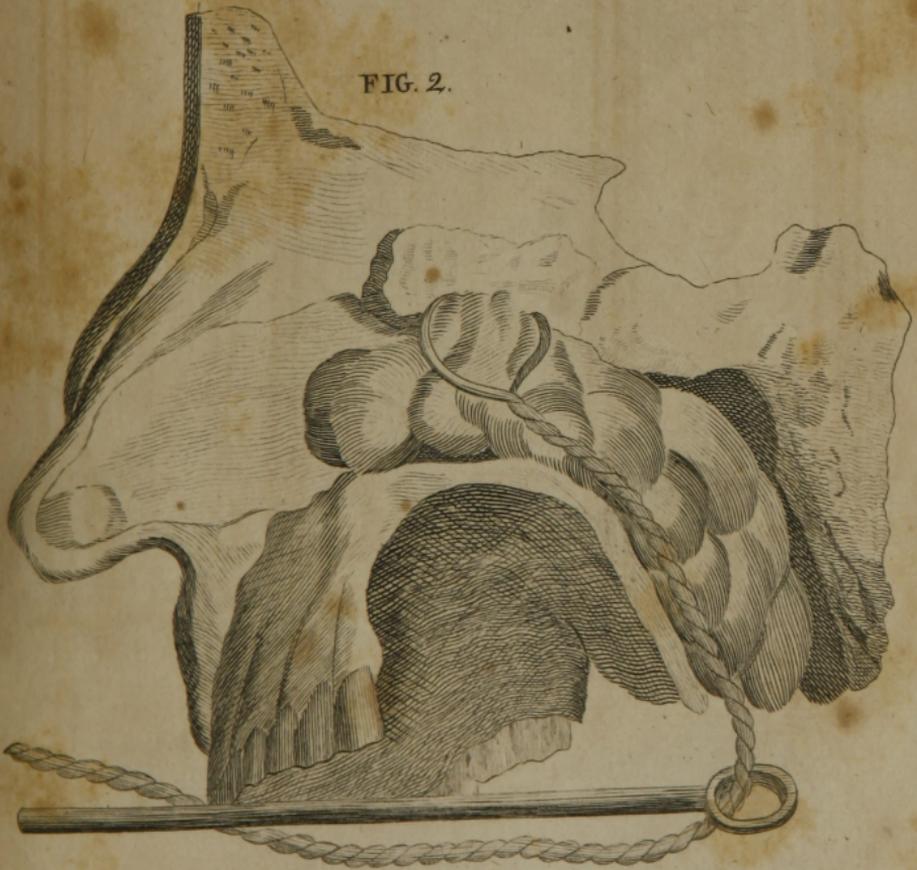


FIG. 2.



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1777



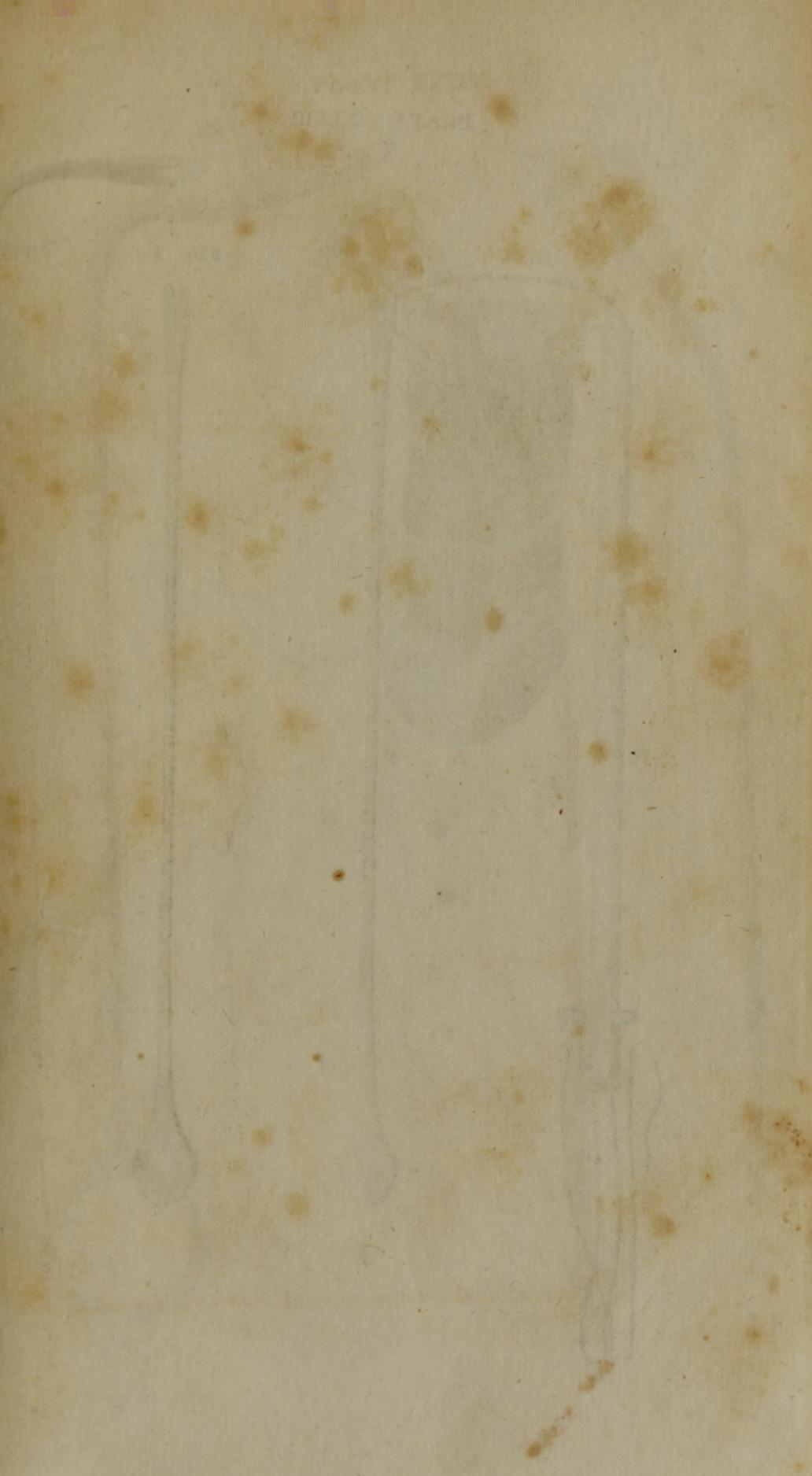


PLATE XXXIII

FIG. 1.

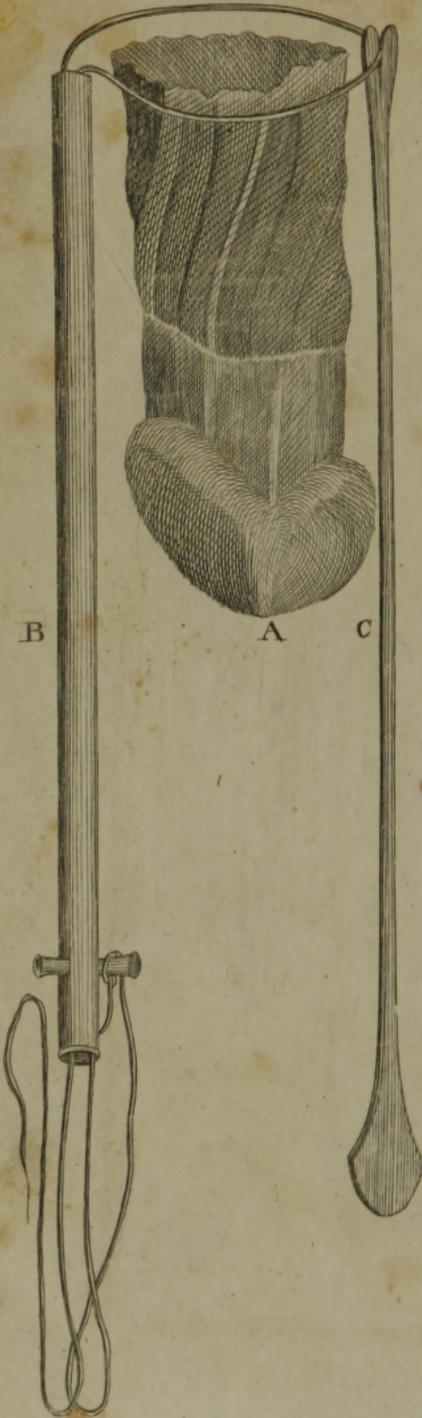


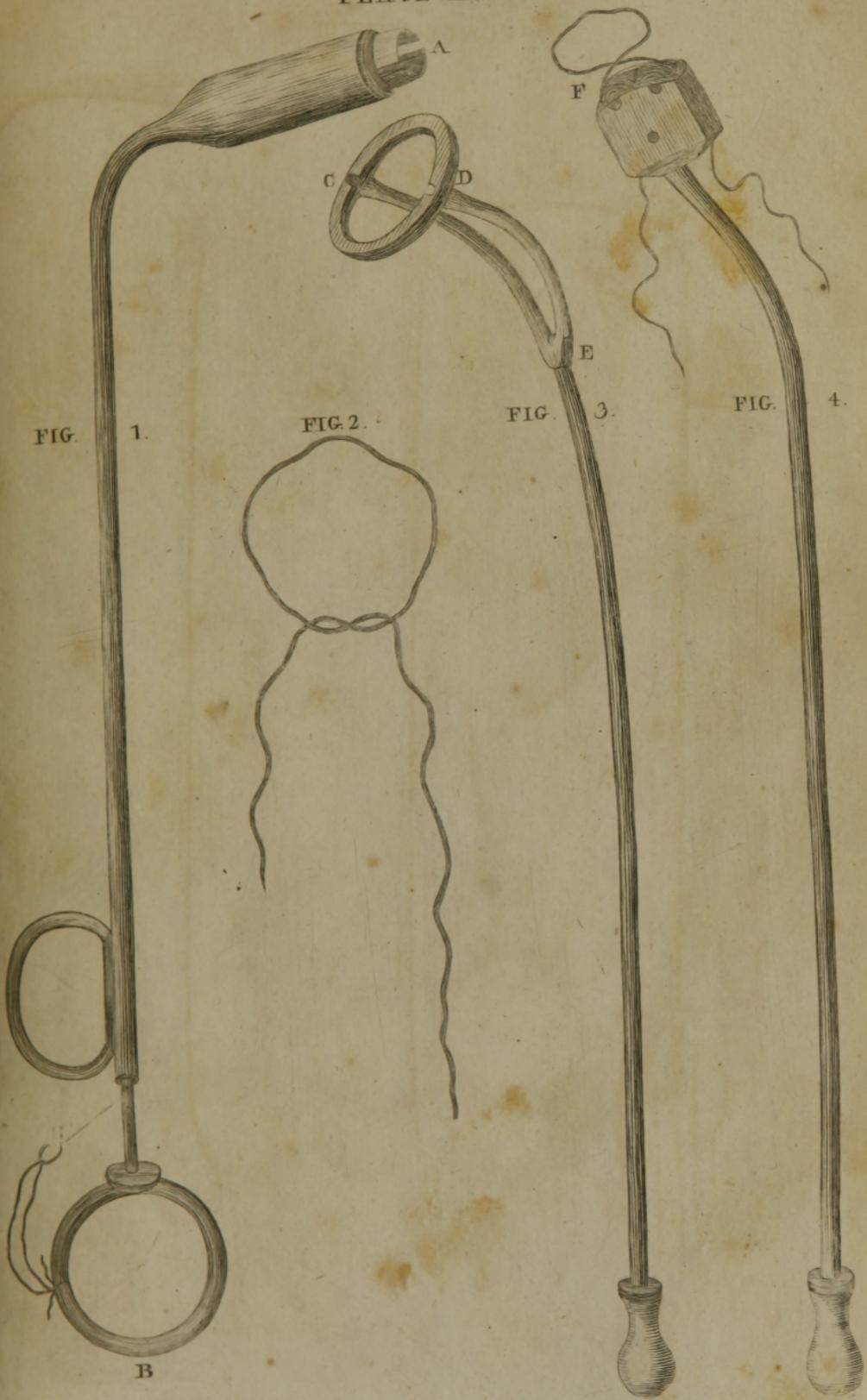
FIG. 2.

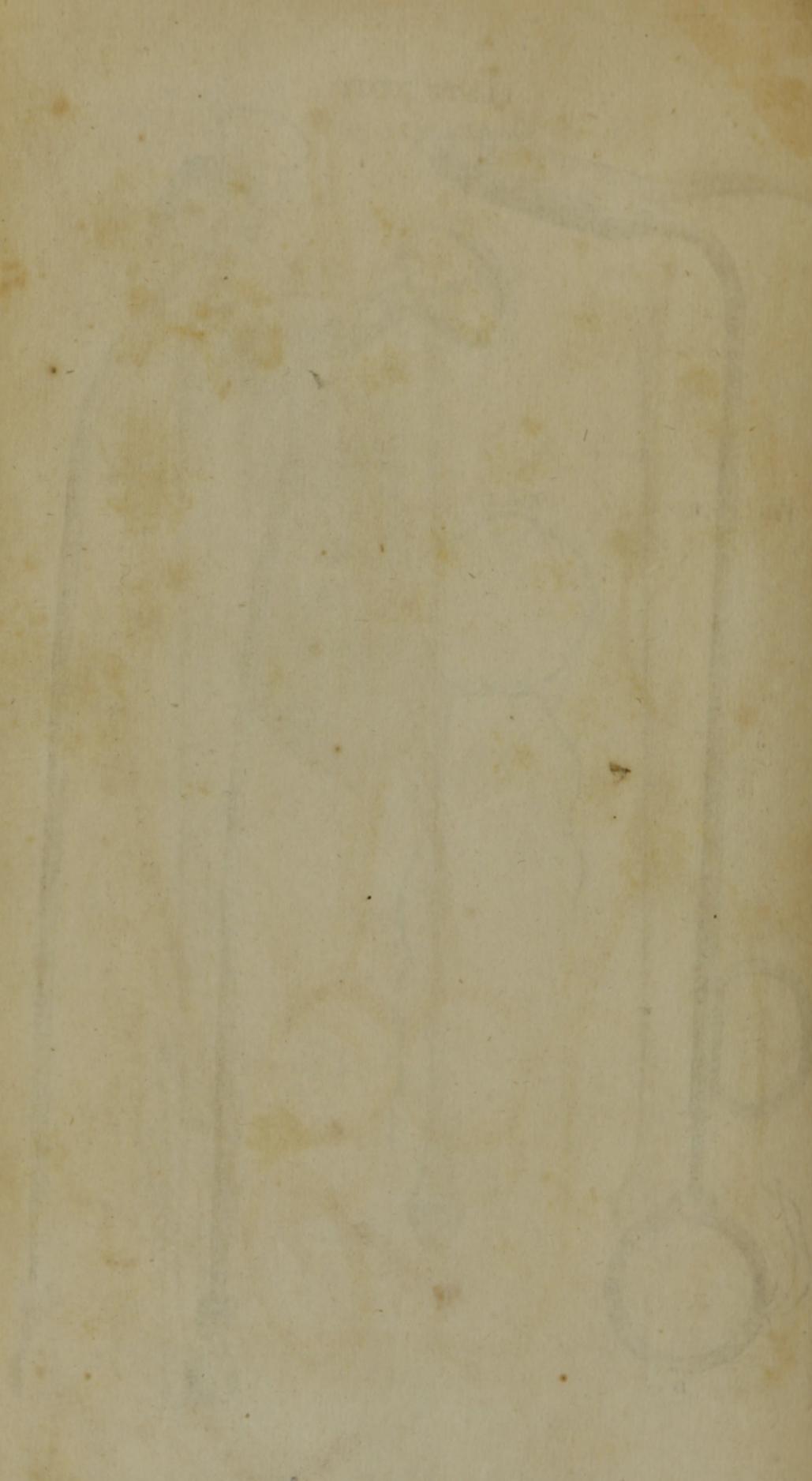


FIG. 3.



PLATE XXXIV







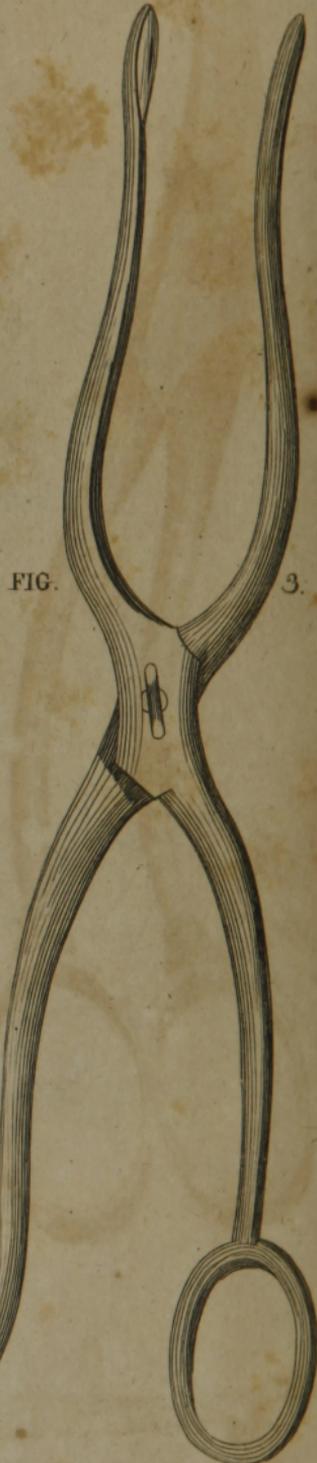
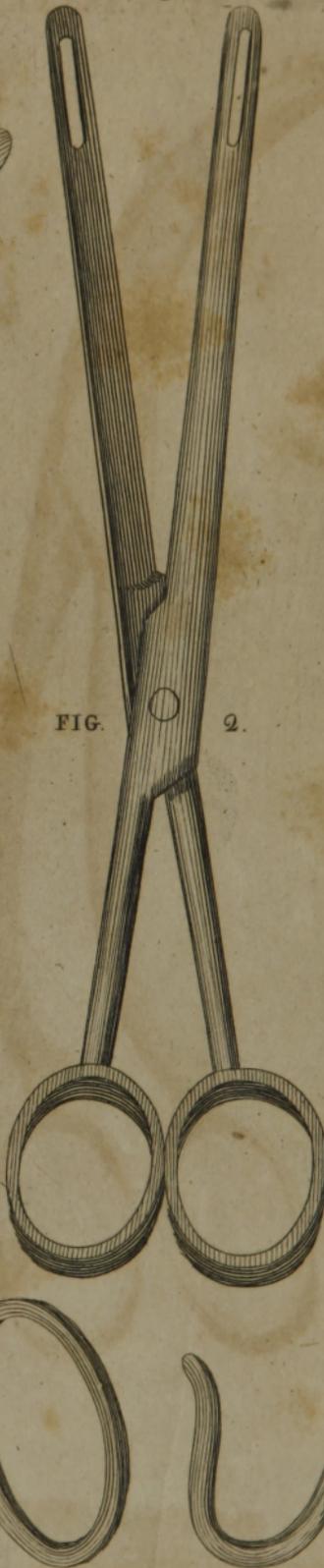


PLATE XXXVI

FIG.

1.



FIG.

2.



FIG.

3.



FIG. 4.







PLATE XXXVII

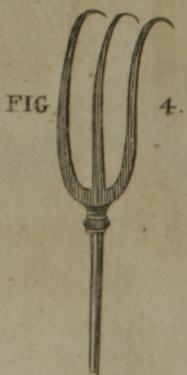


PLATE XXXVIII

FIG. 1.



FIG. 2.



FIG. 3.





6
1773 1774



FIG.

1.

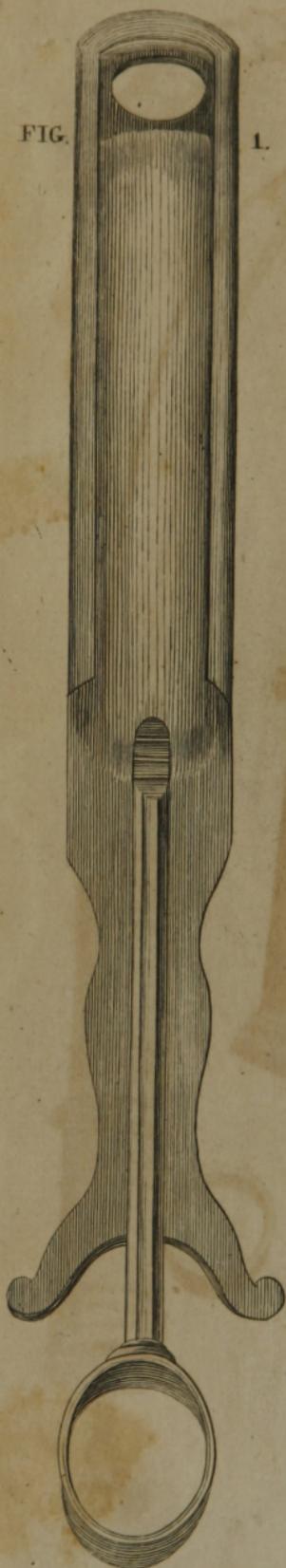


FIG.

2.



FIG.

3.



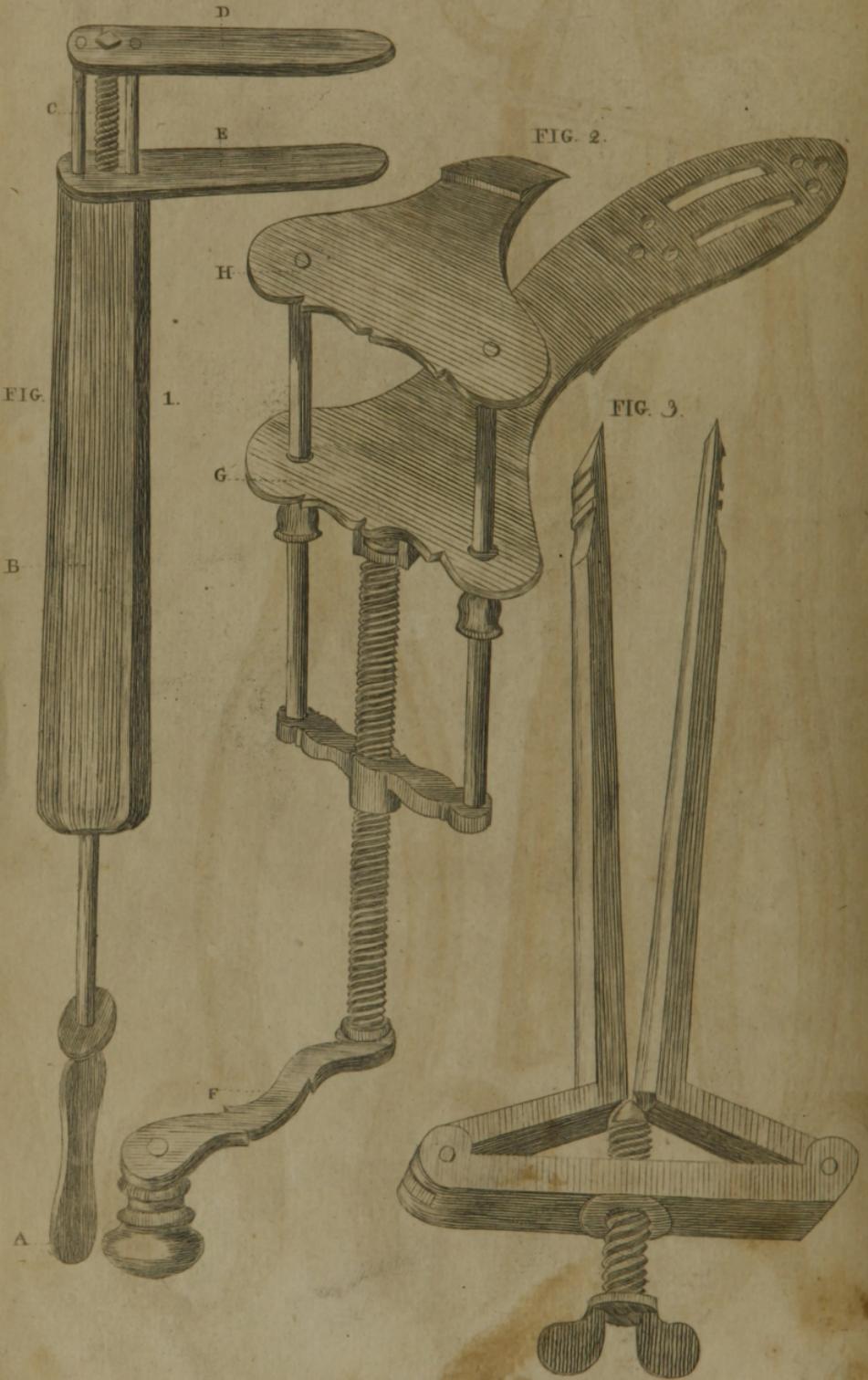


FIG. 4.





PLATE XLI



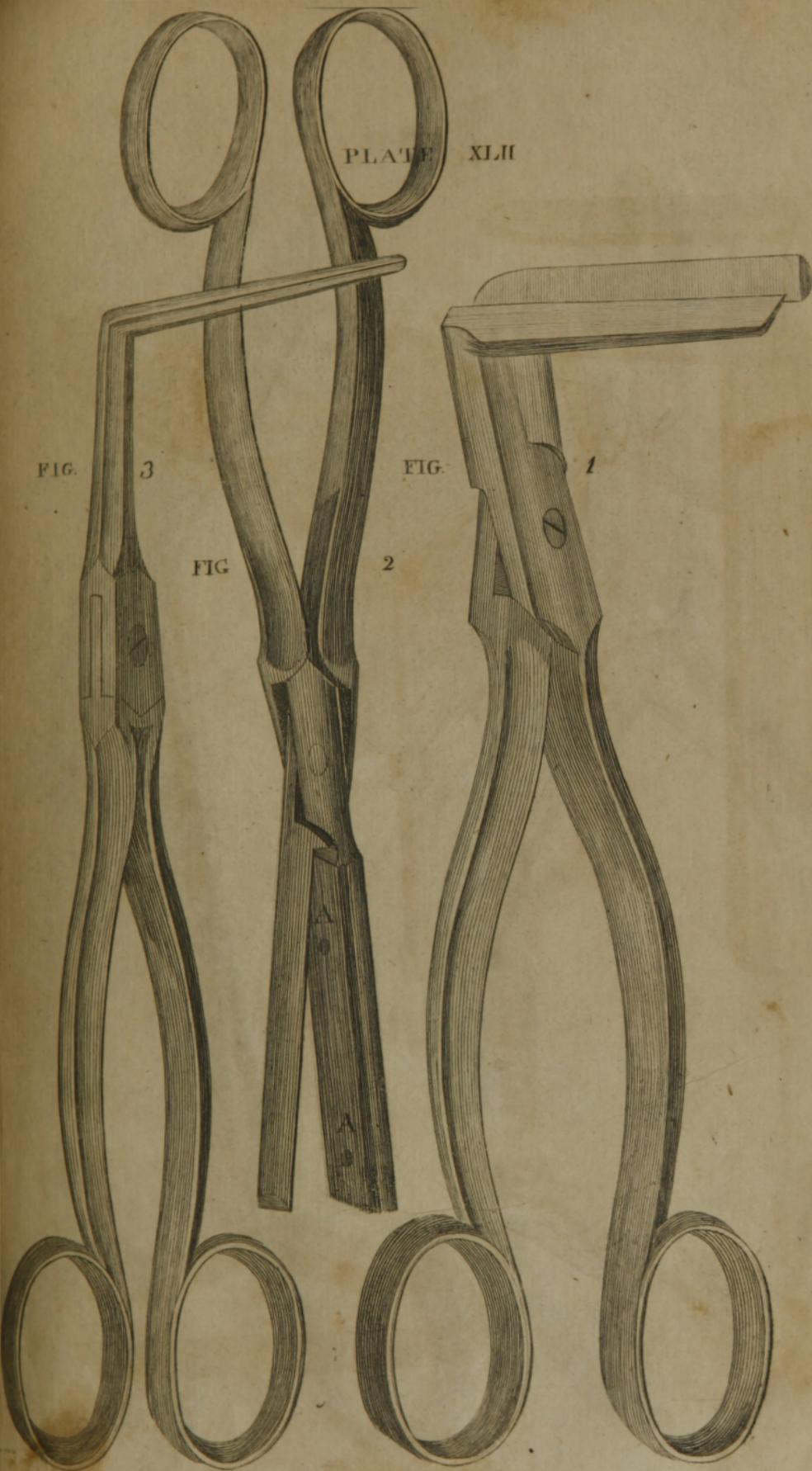


FIG.

3

FIG

2

FIG.

1



PLATE XLIII

FIG.

1.



FIG.

2.



FIG. 1.



FIG. 2.



FIG. 3.

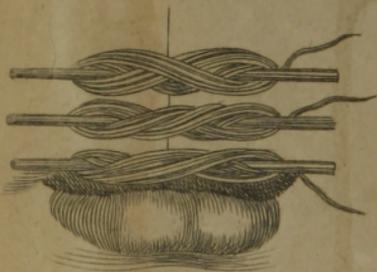


FIG. 4.



FIG. 5.



FIG. 6.

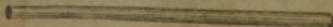


FIG. 7.

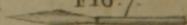


PLATE XLV



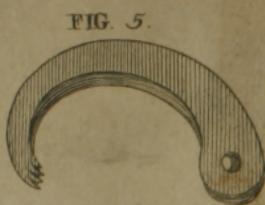
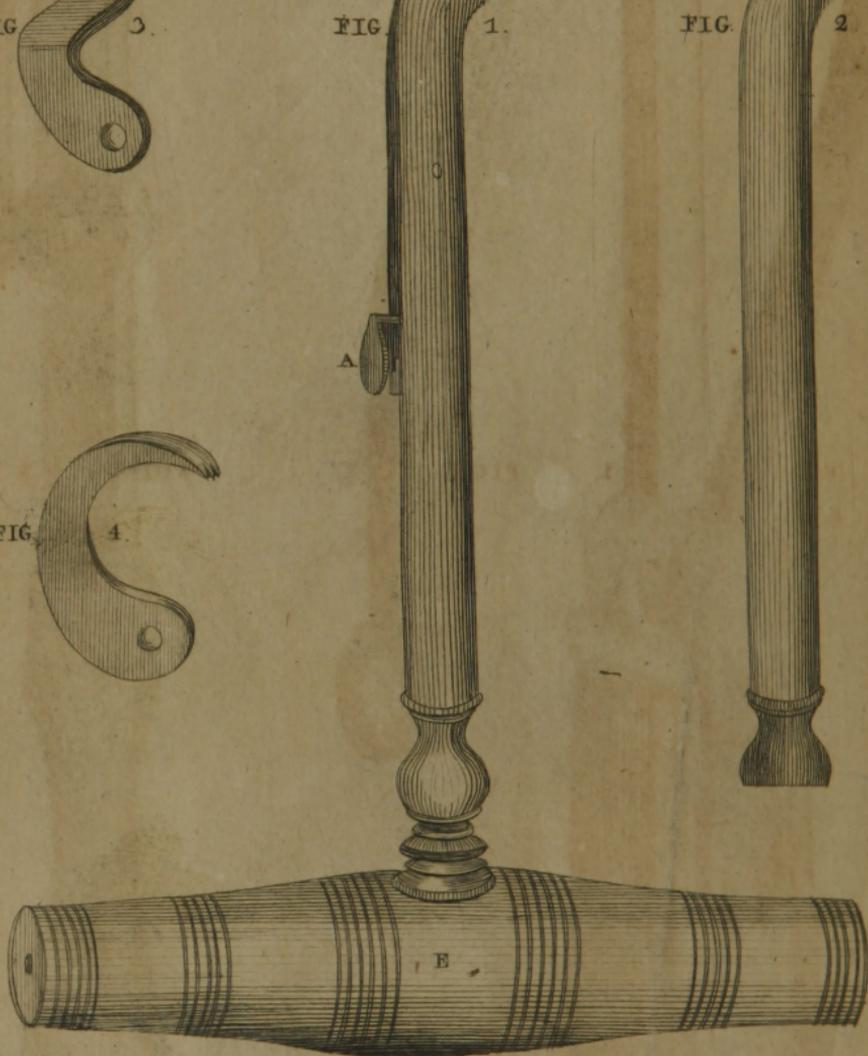
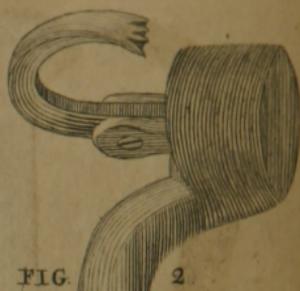


PLATE XLVII

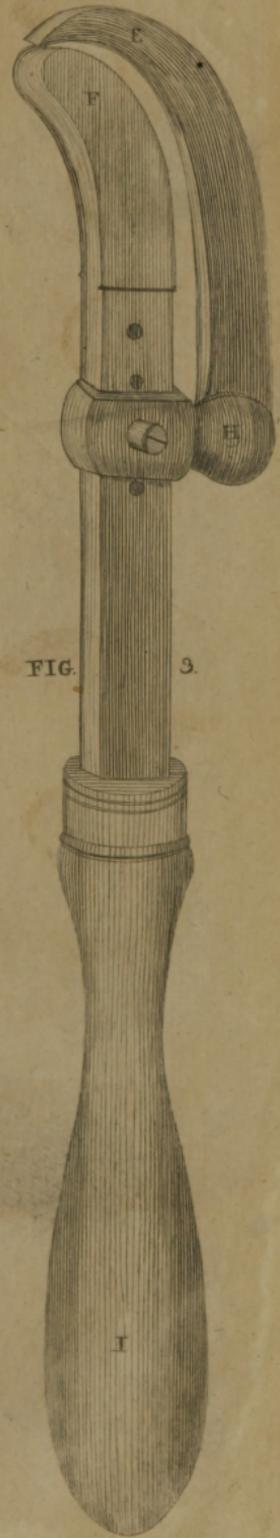
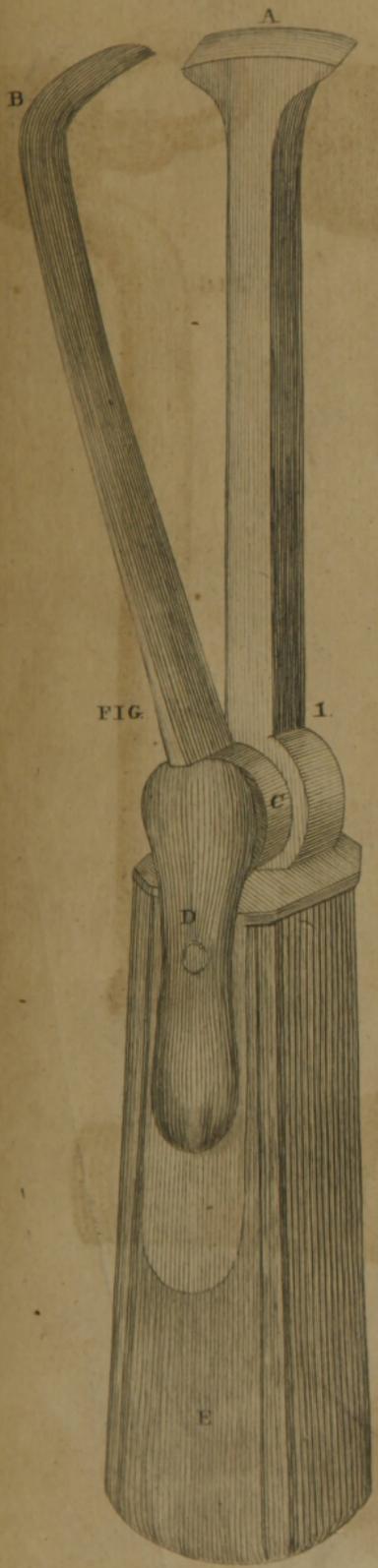


PLATE XLVIII

FIG.

1.



FIG.

2.



FIG.

3.



FIG. 4.

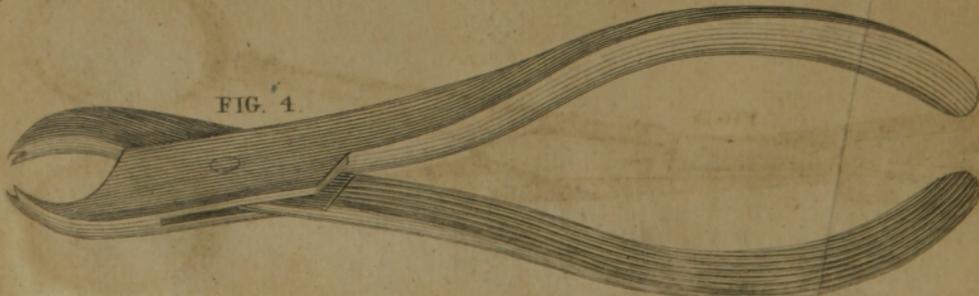


PLATE XLIX

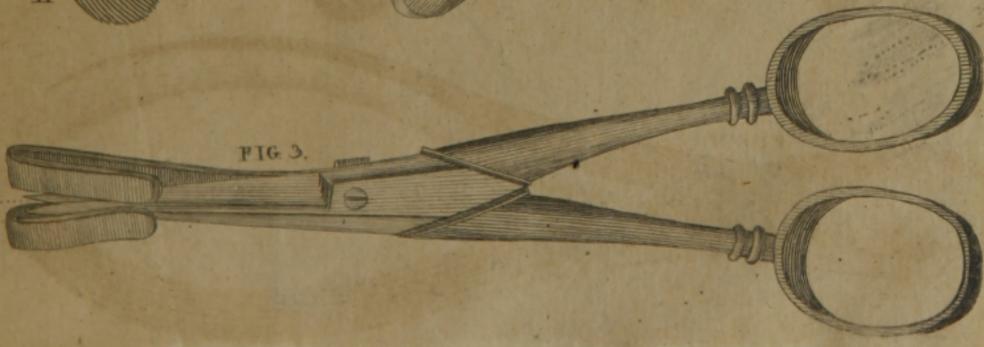


PLATE L

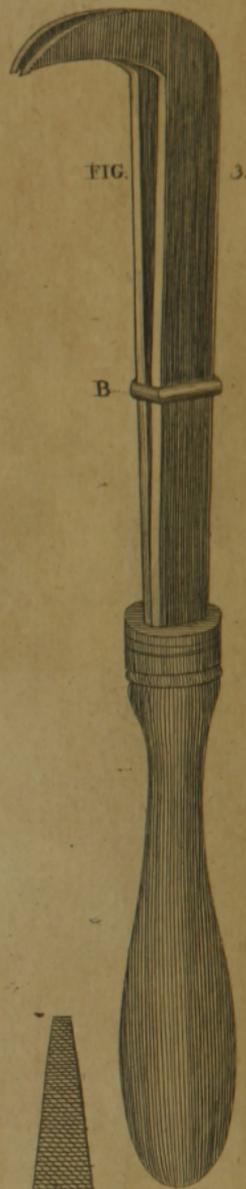


FIG. 1



FIG. 2



FIG. 3



FIG. 4



PLATE LII

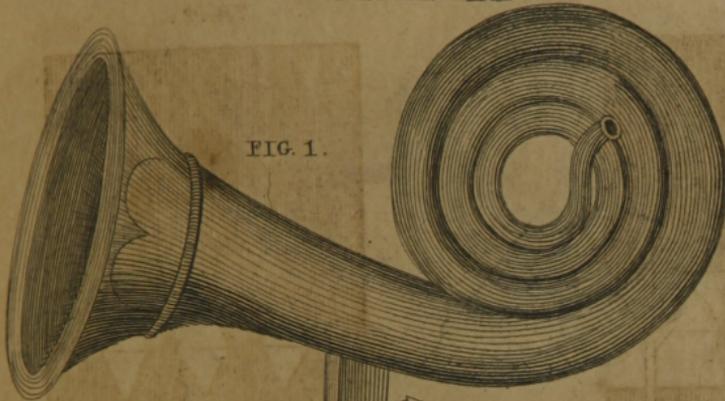


FIG. 1.



FIG.

2.

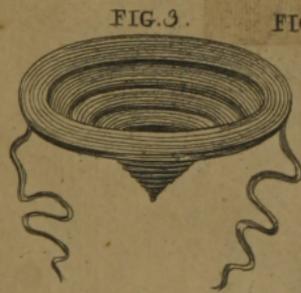


FIG. 3.

FIG.

4.

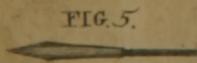


FIG. 5.

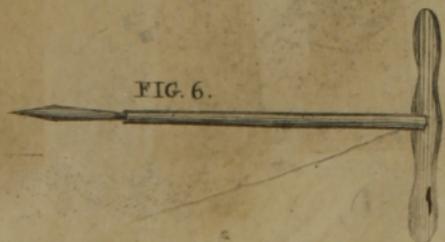


FIG. 6.





FIG. 1.

FIG. A 2.

FIG. 3.



FIG. 1.

FIG. 2.

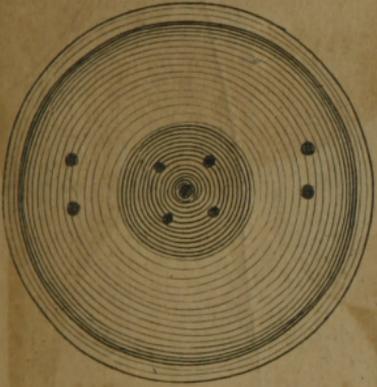


FIG. 3.

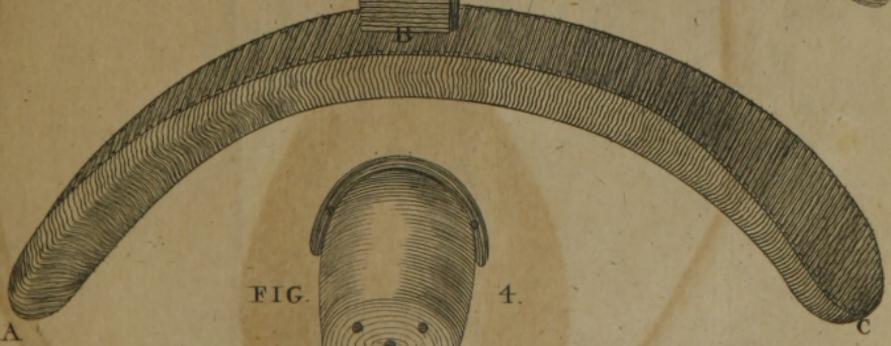
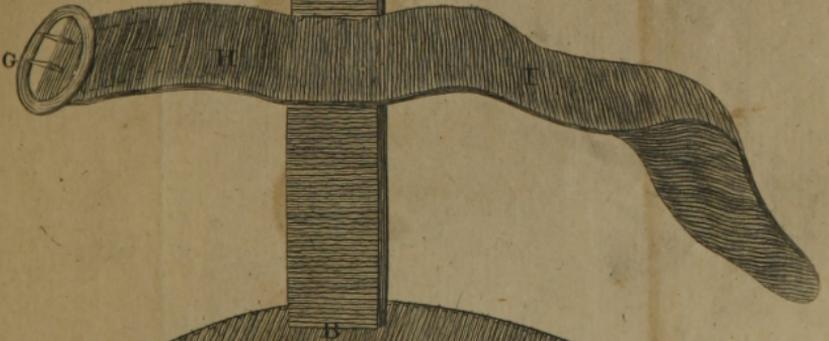
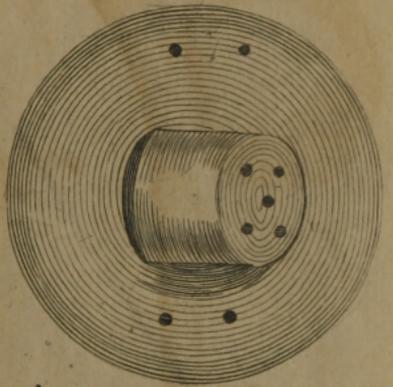


FIG. 4.



FIG. 5.



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PLATE LV

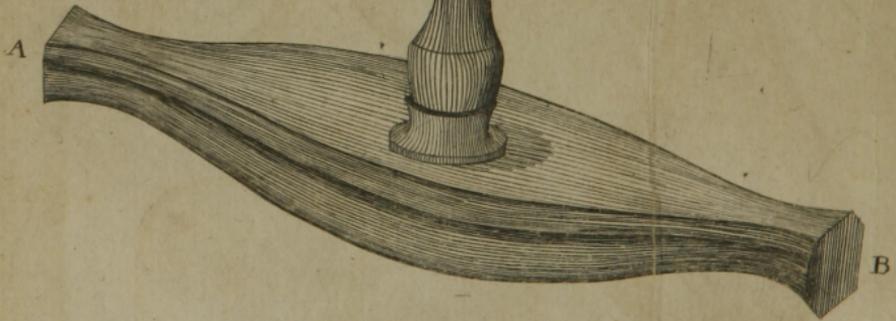


PLATE LVI

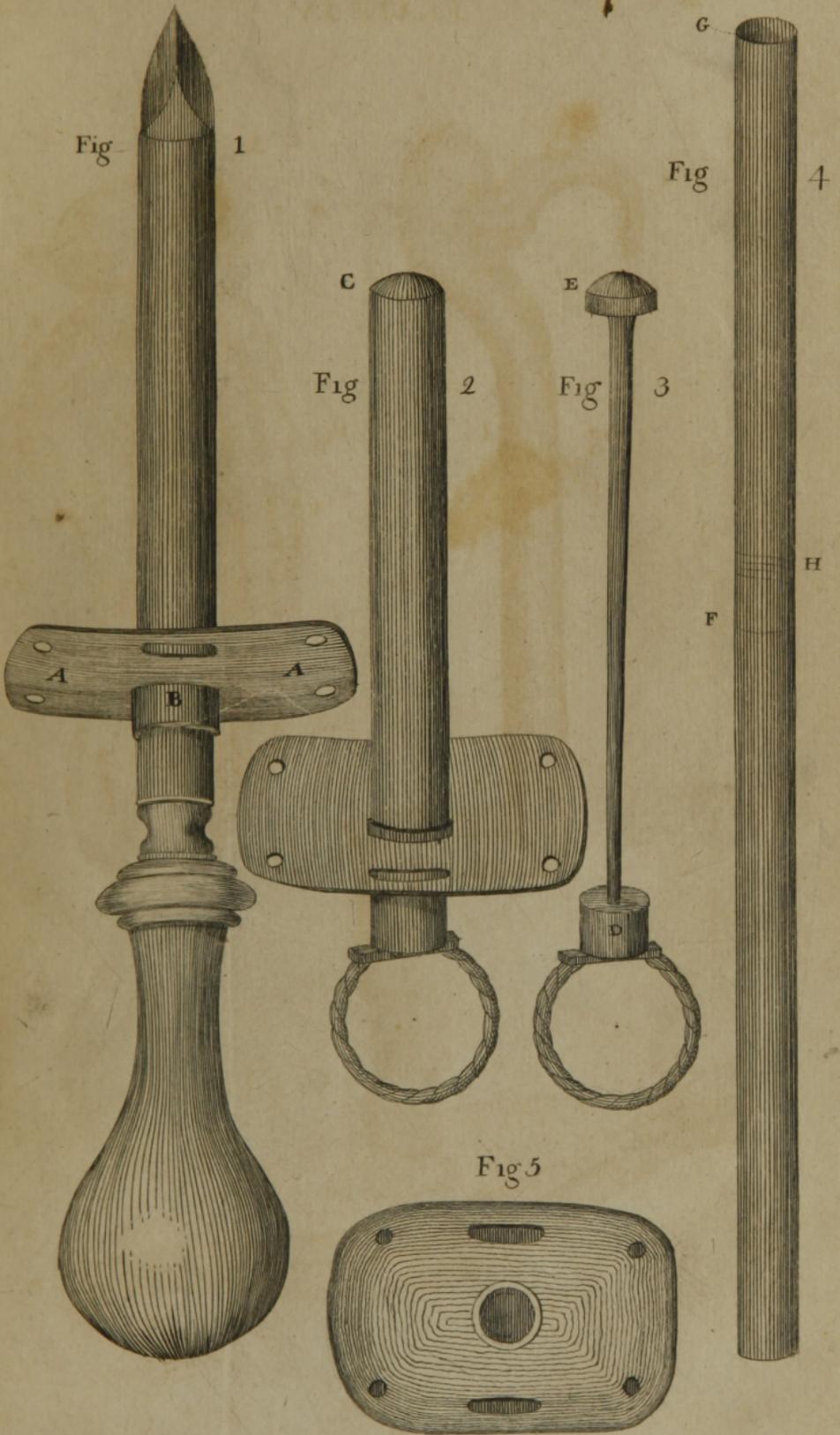
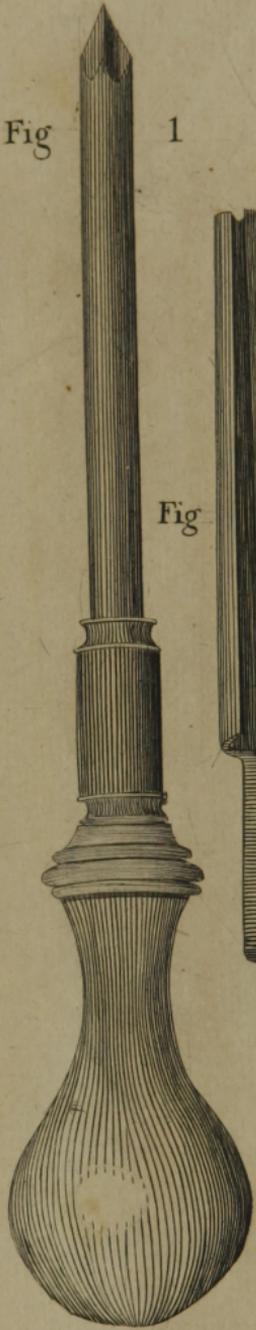


PLATE LVII



1

Fig

2



Fig

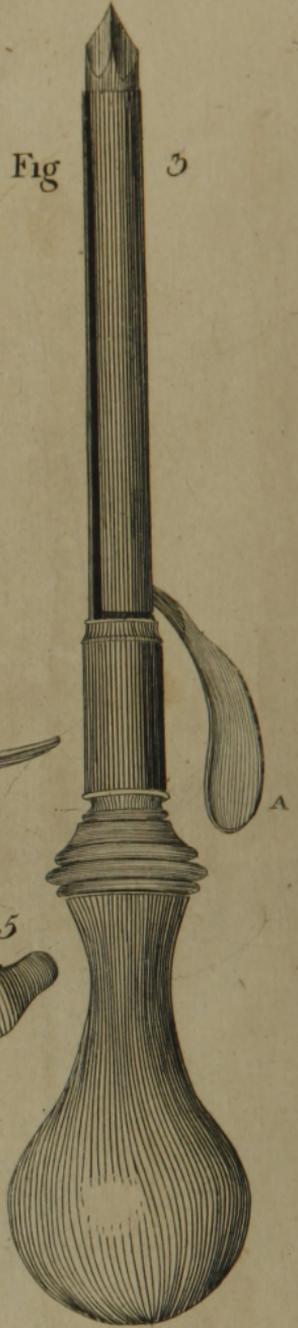
4

A

B

Fig

5



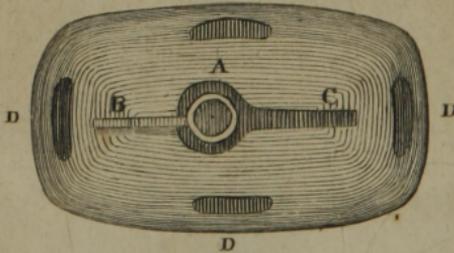
Fig

3

A

Fig 6

D



D

B

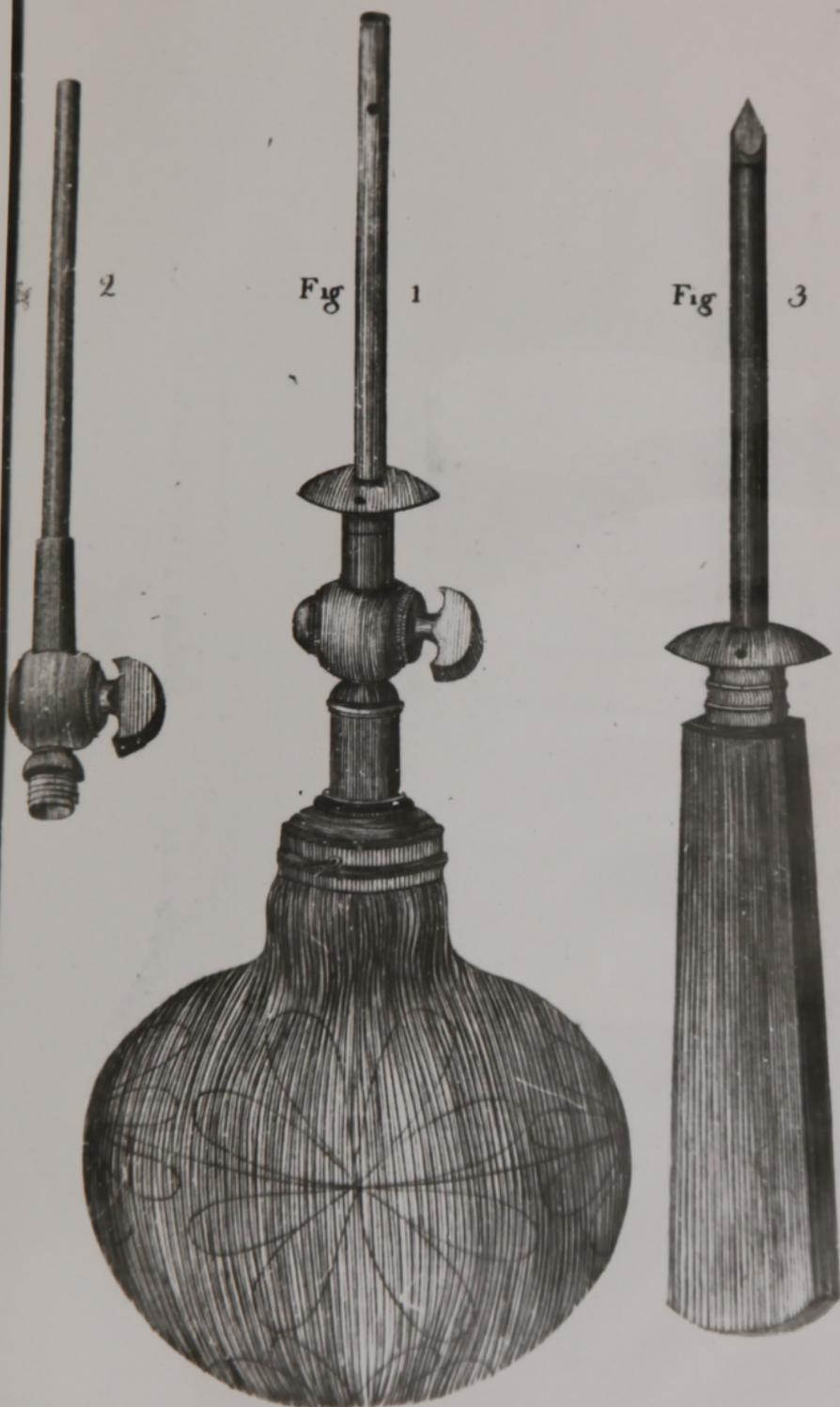
A

C

D

D

PLATE LVIII



Photocopy supplied from
The Cleveland Medical Library.
1959.

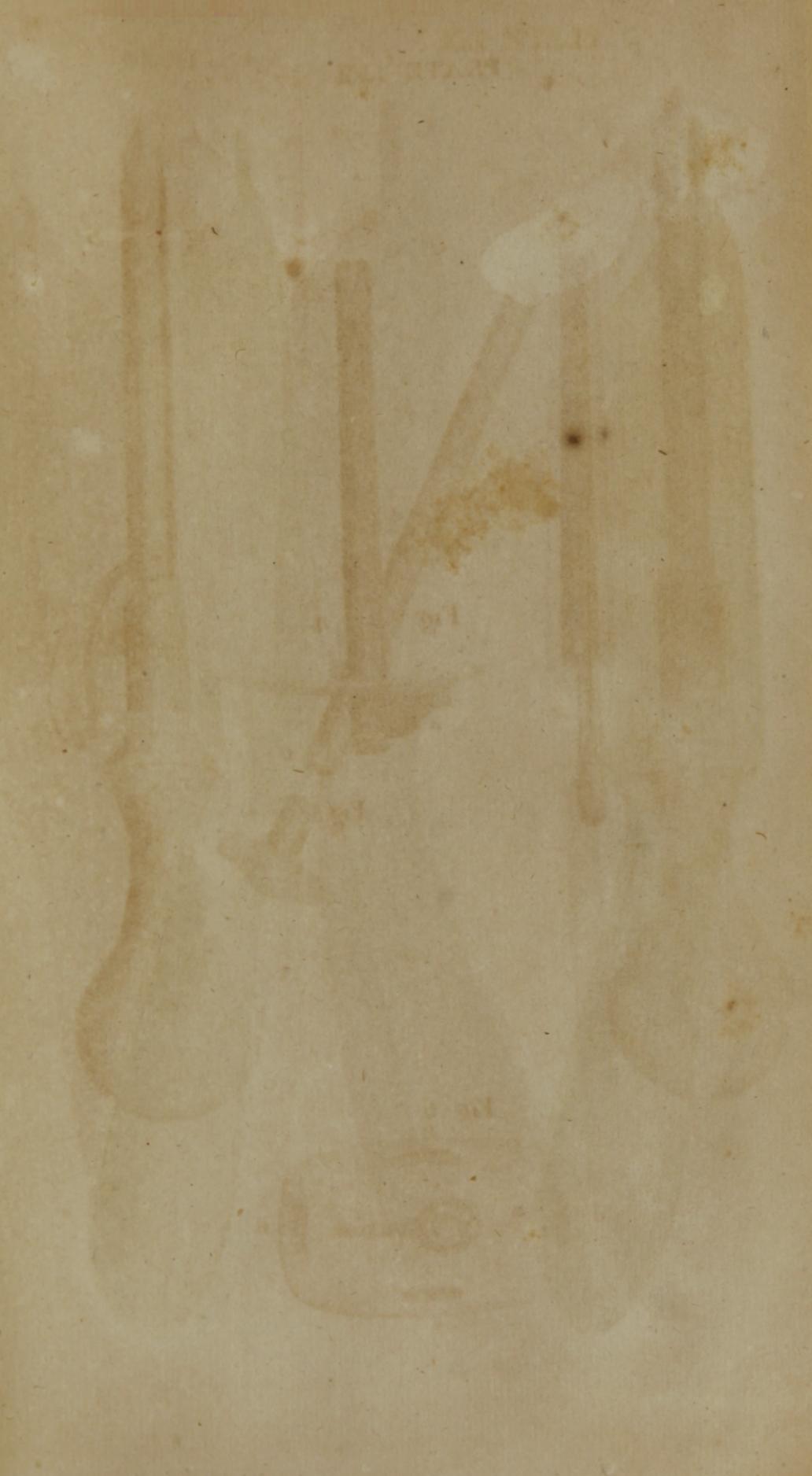


Fig 1

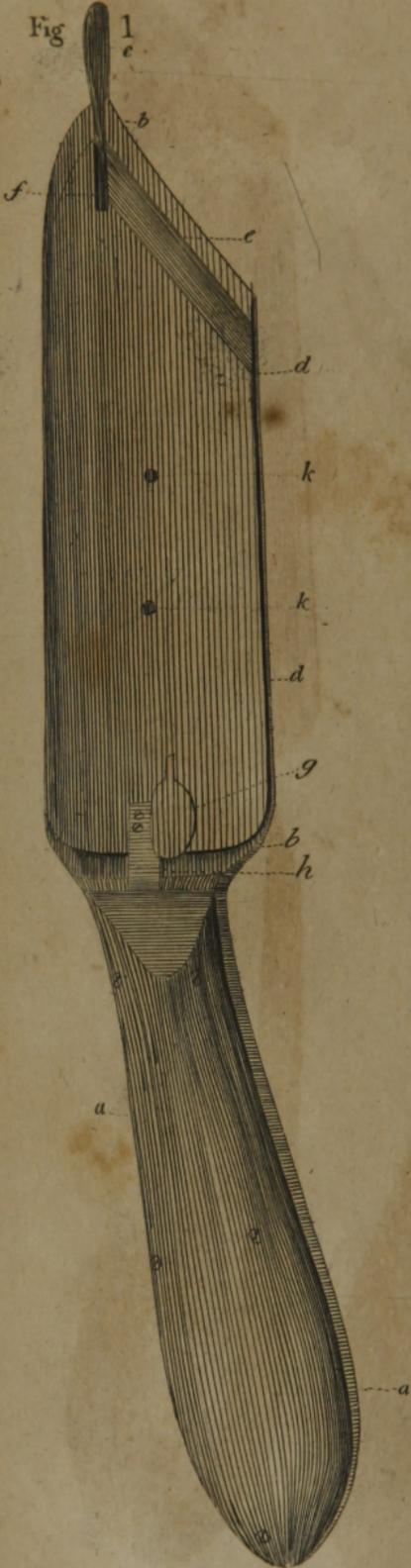


Fig 2



Fig 4



Fig 3



Fig 5

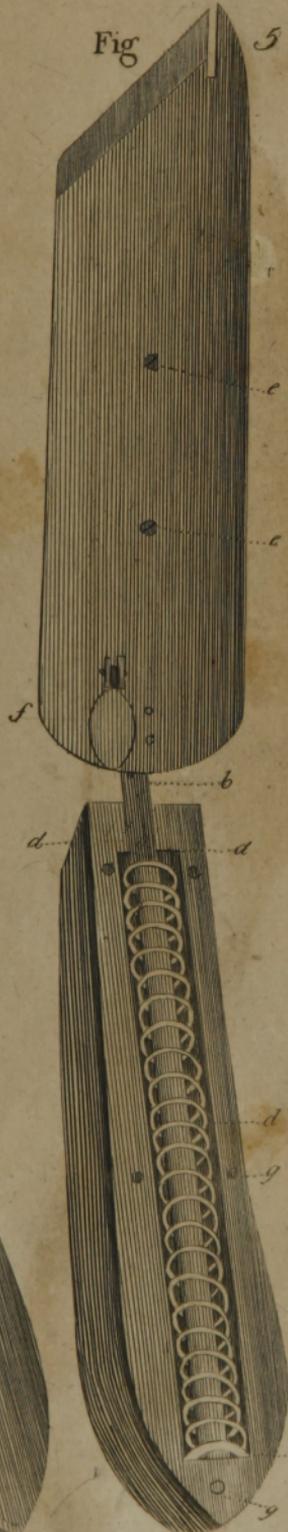
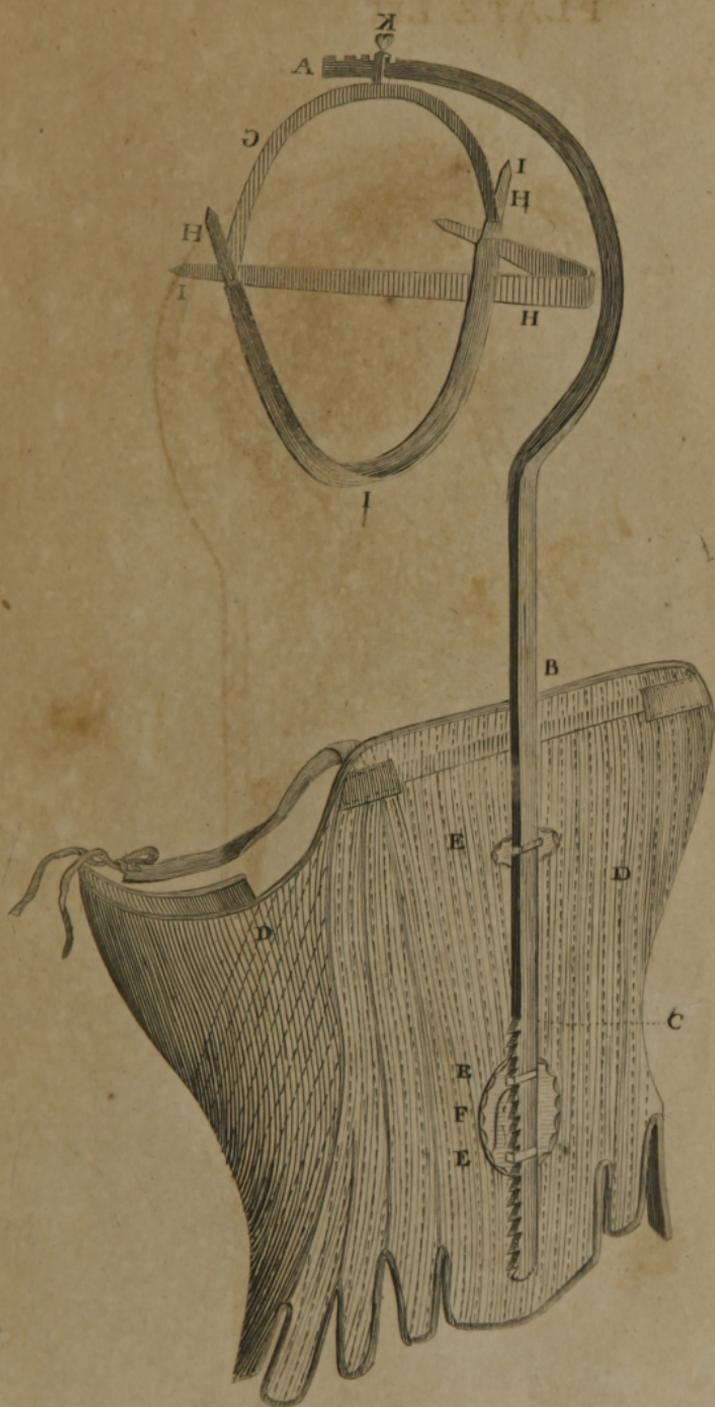
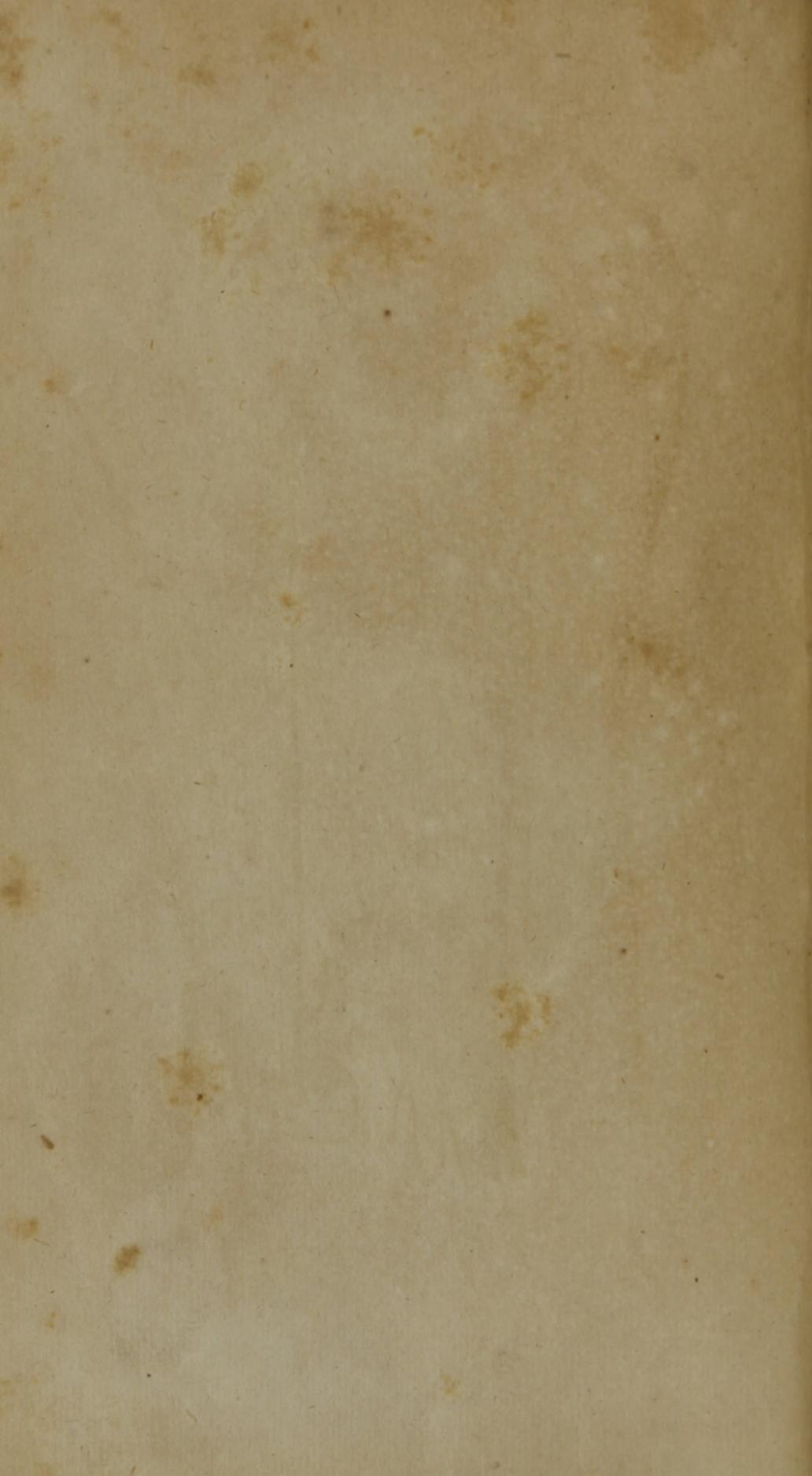




PLATE LXI







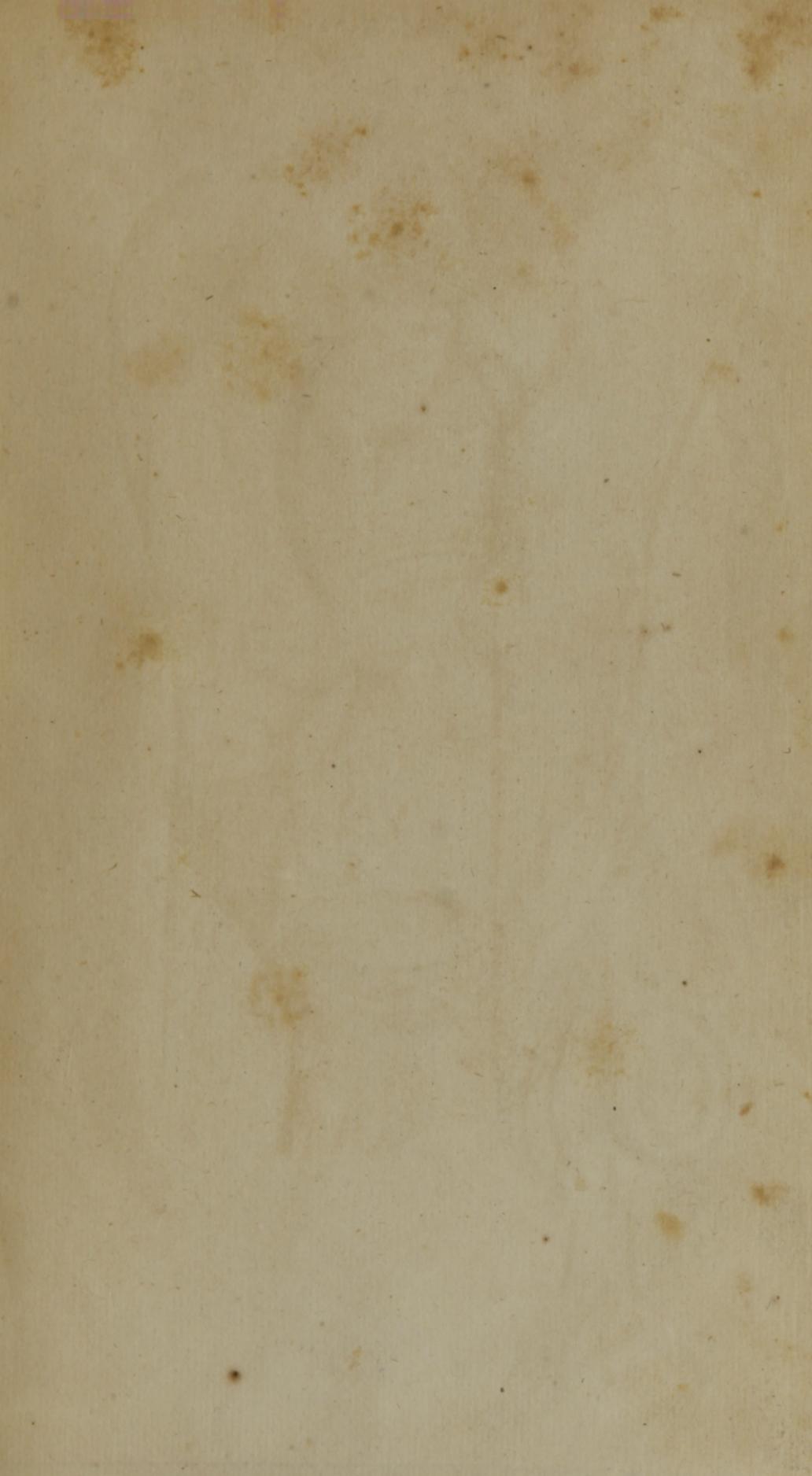


Fig. 3.

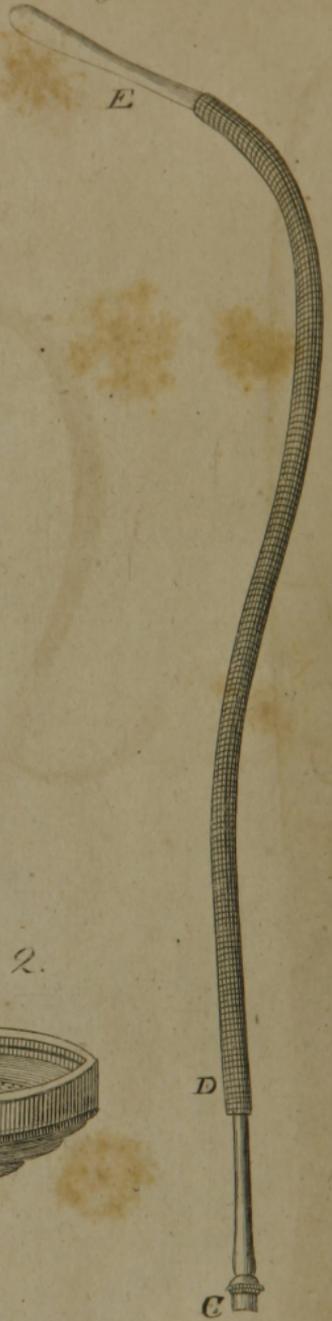


Fig. 4.

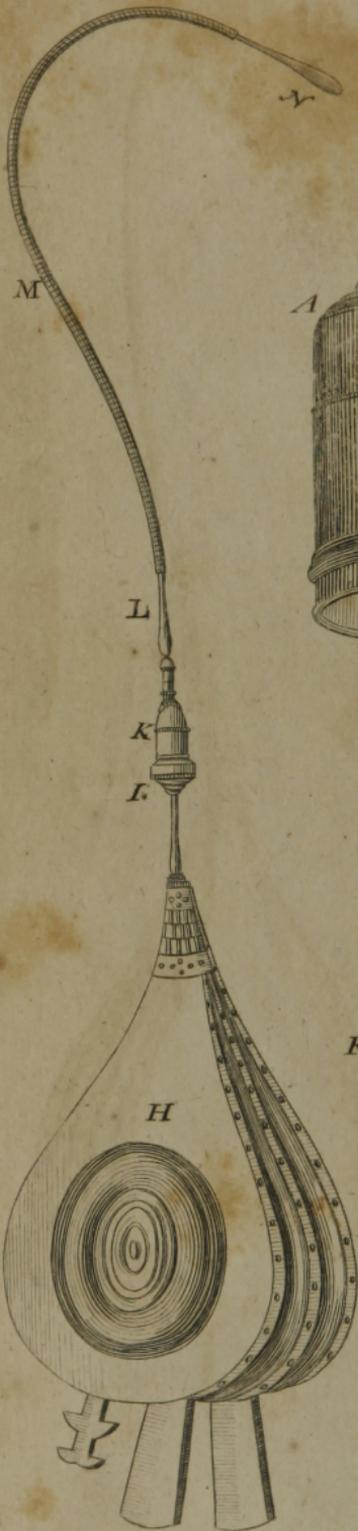


Fig. 1.

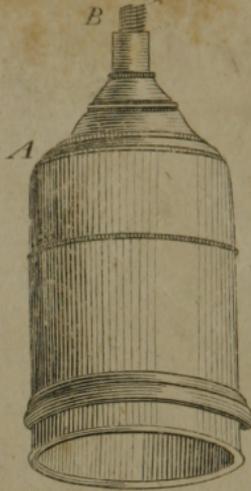


Fig. 2.



Fig. 2.



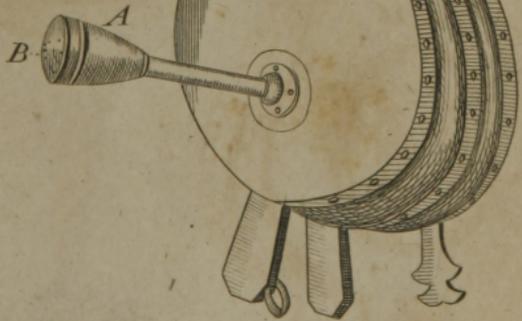
Fig. 1.



Fig. 3.



Fig. 4.



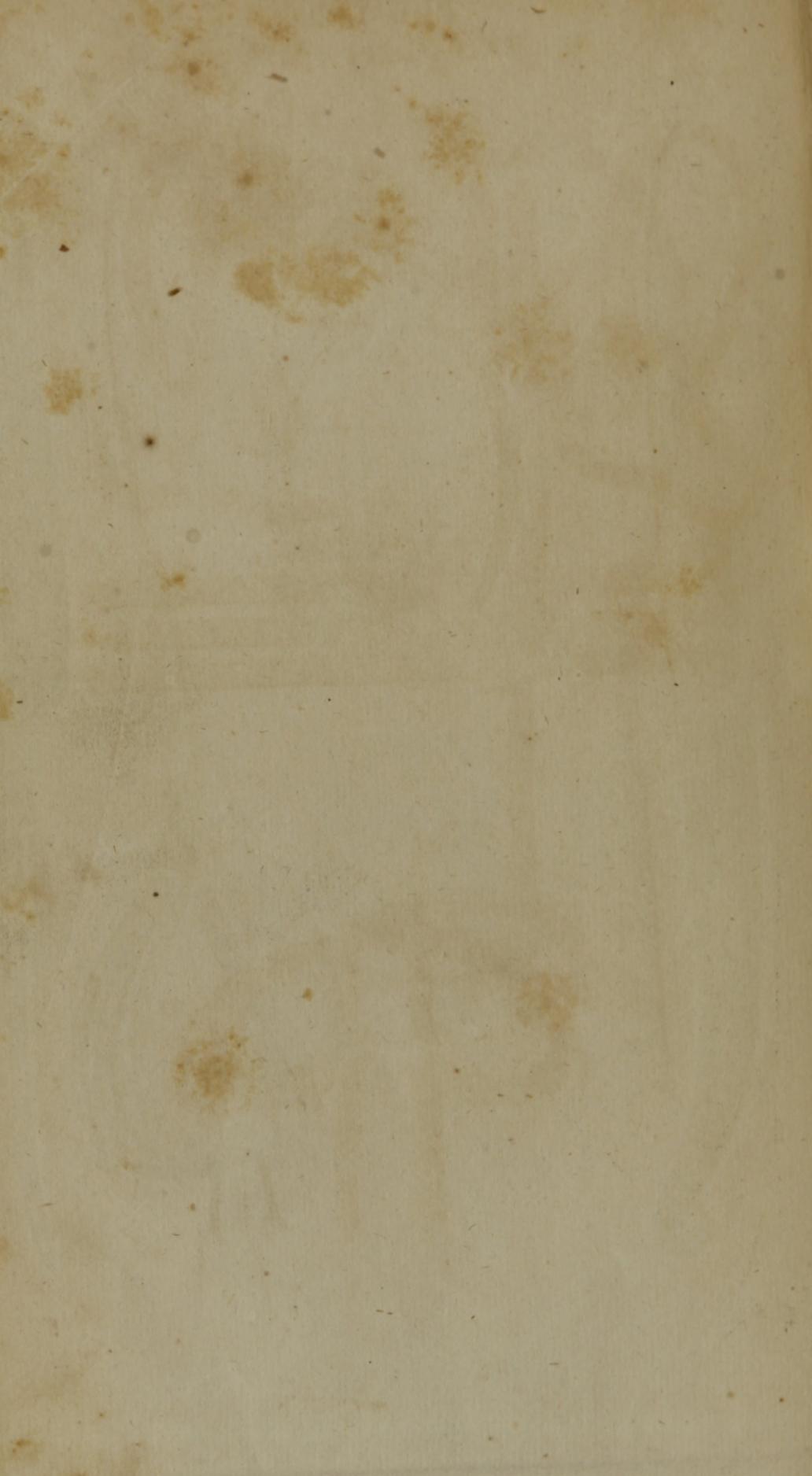
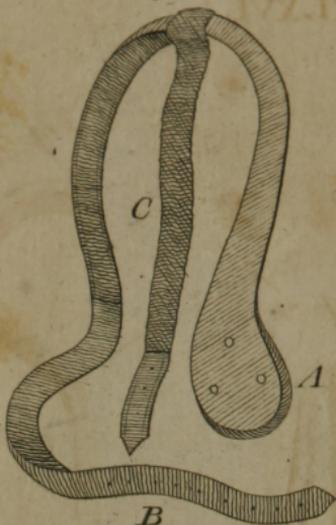


Plate 1. 77



Fig. 1.

Fig. 2.



E E



Fig. 3.

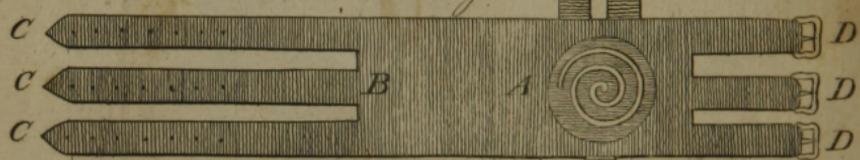


Fig. 4.

F



Fig. 1.

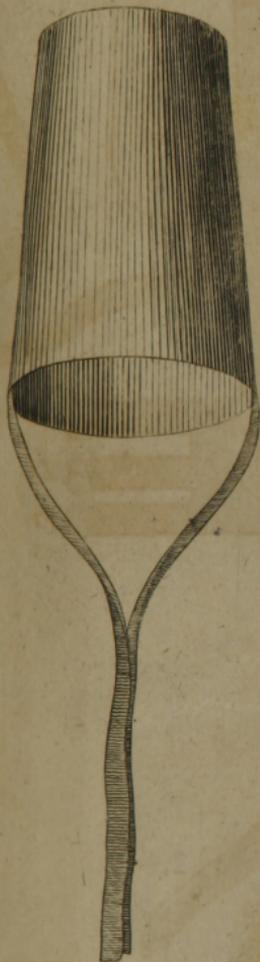


Fig. 2.

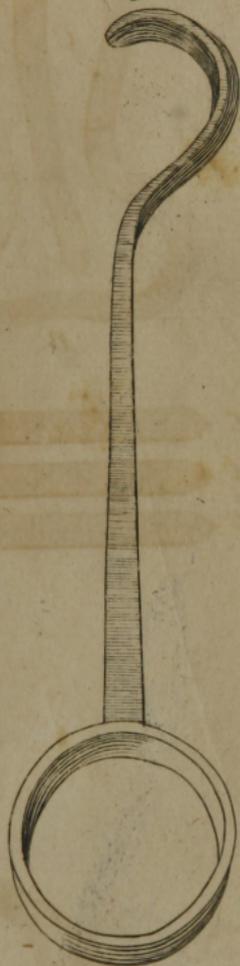


Fig. 4.

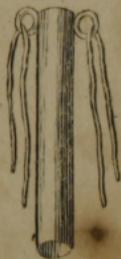


Fig. 3.

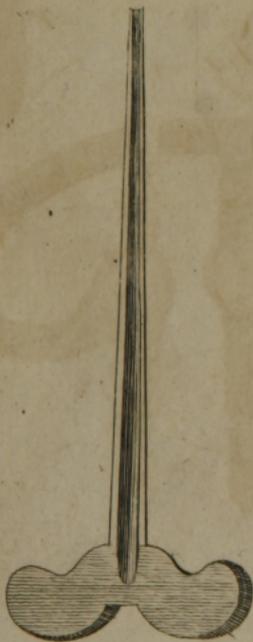


PLATE XLVI



Fig. 2.



Fig. 1.



Fig. 3.



Fig. 5.

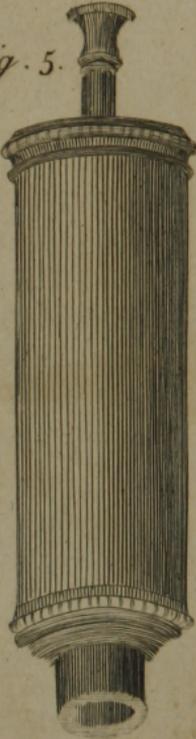


Fig. 4.



Fig. 1.



Fig. 2.



Fig. 3.

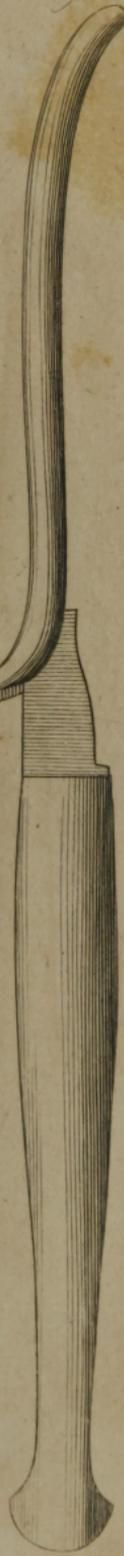


Fig. 4.



1877.1.10.10



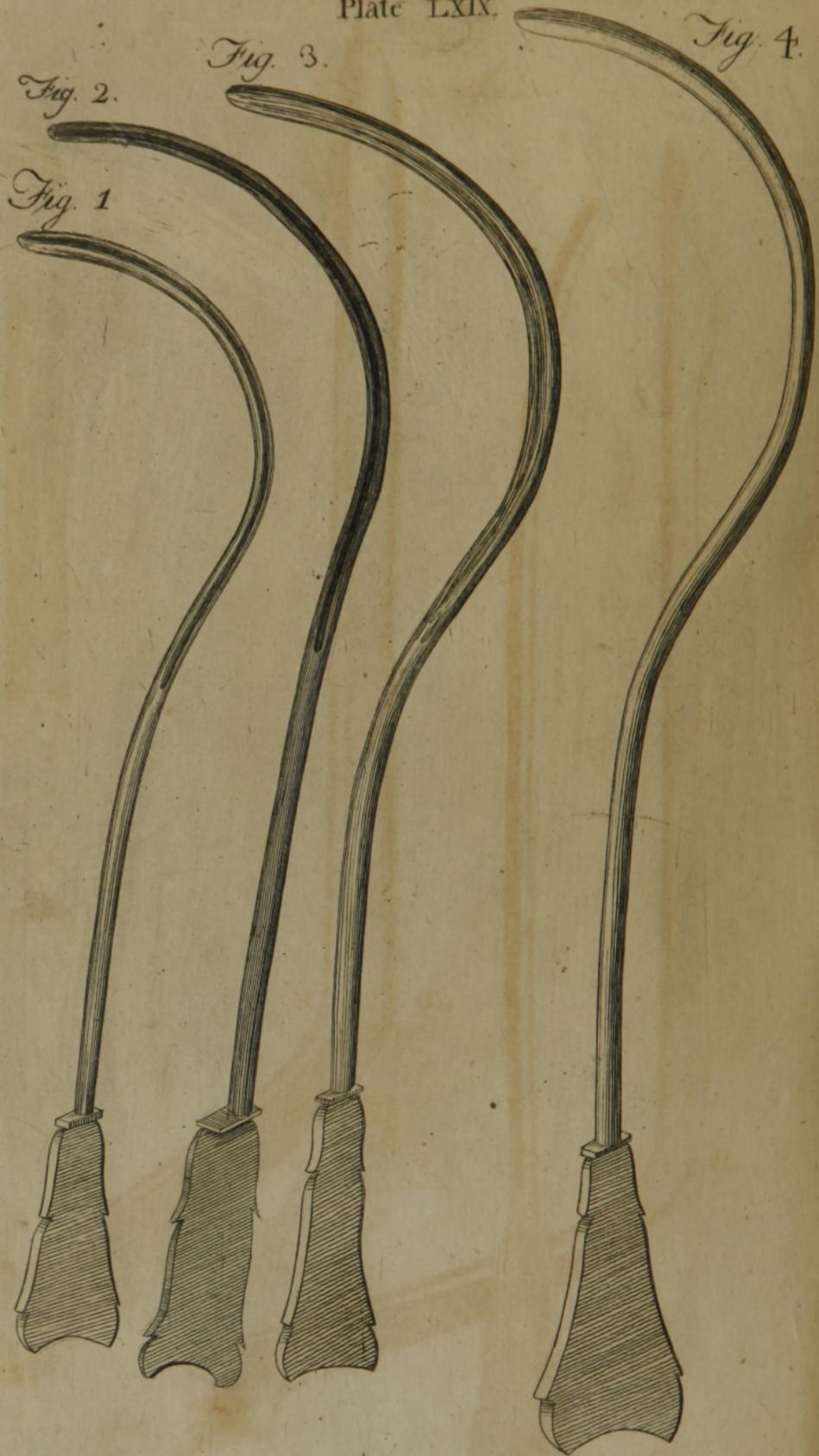


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 1.

Fig. 1.

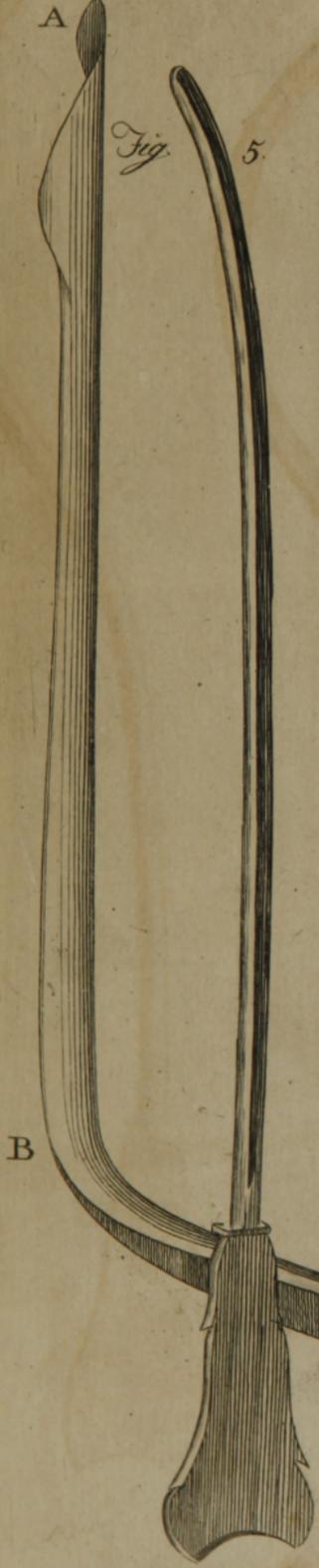


Fig. 2.



Fig. 3.



Fig. 4.



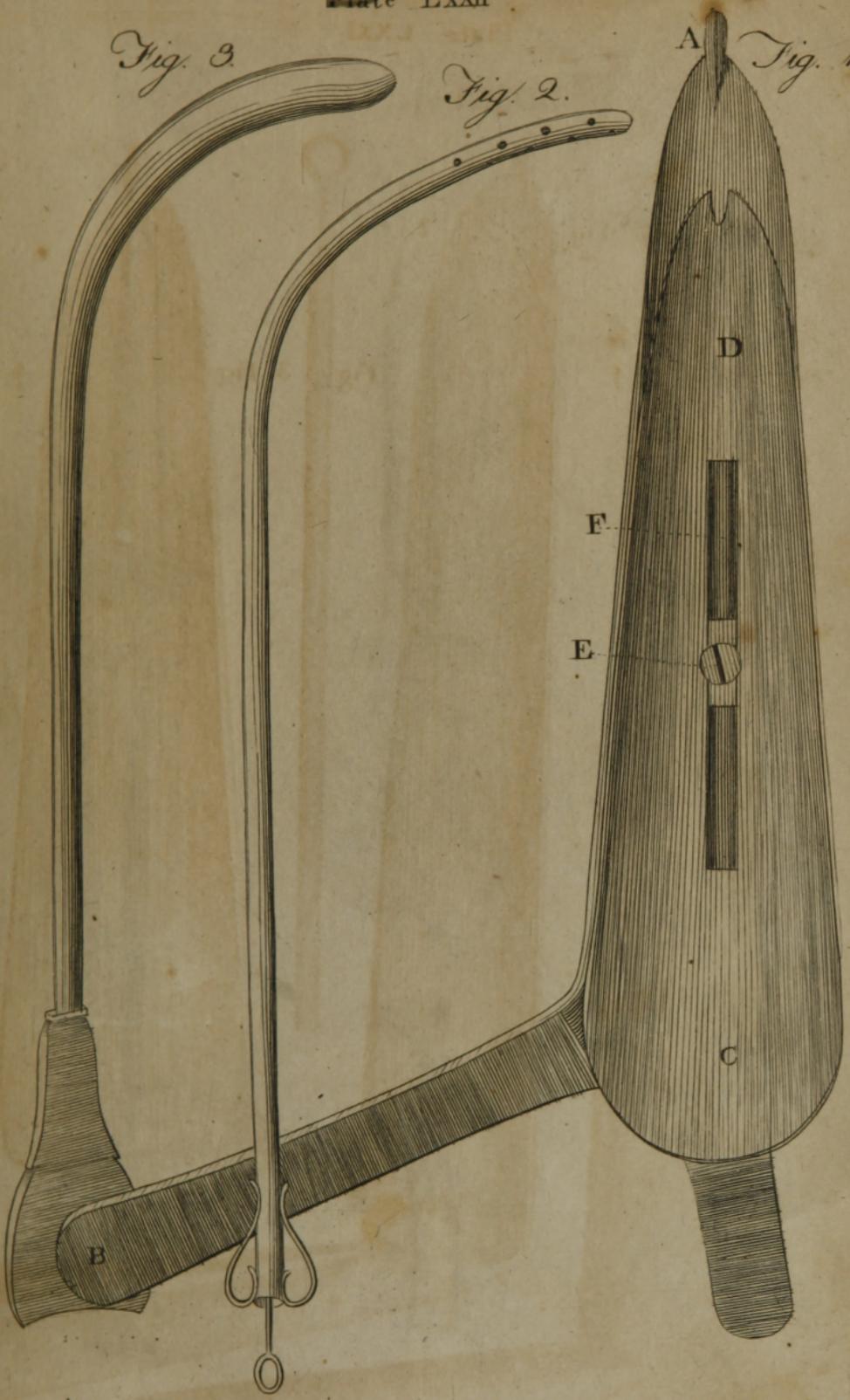




Fig. 3.

Fig. 2.

Fig. 1.



1723

Plate LXXIII

Fig. 2.

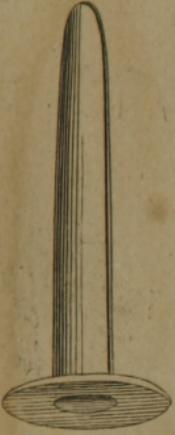


Fig. 1.

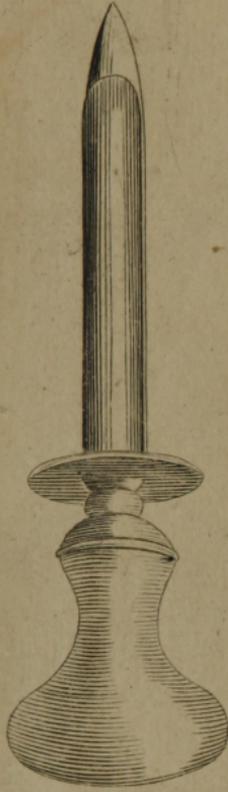


Fig. 4.

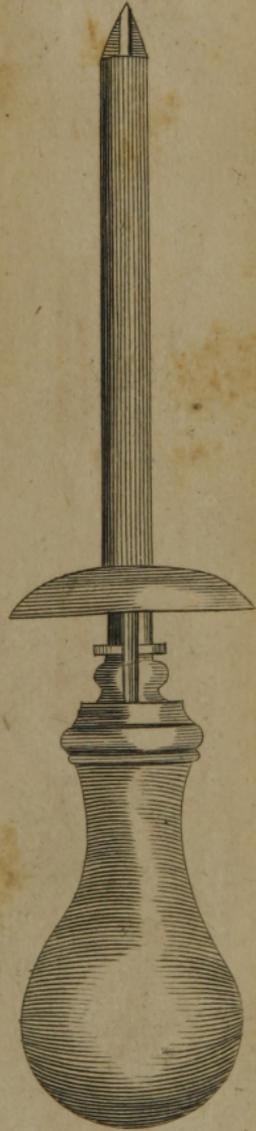


Fig. 3.

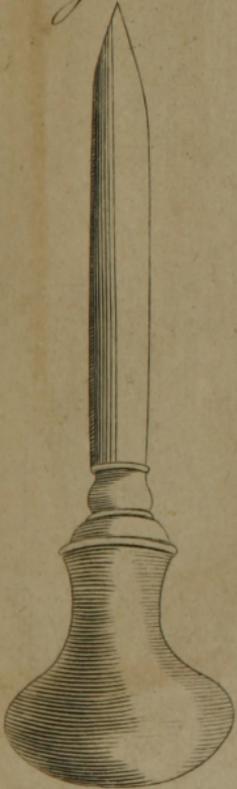


Fig. 5.



PLATE XVIII



PLATE I



Fig. 1.

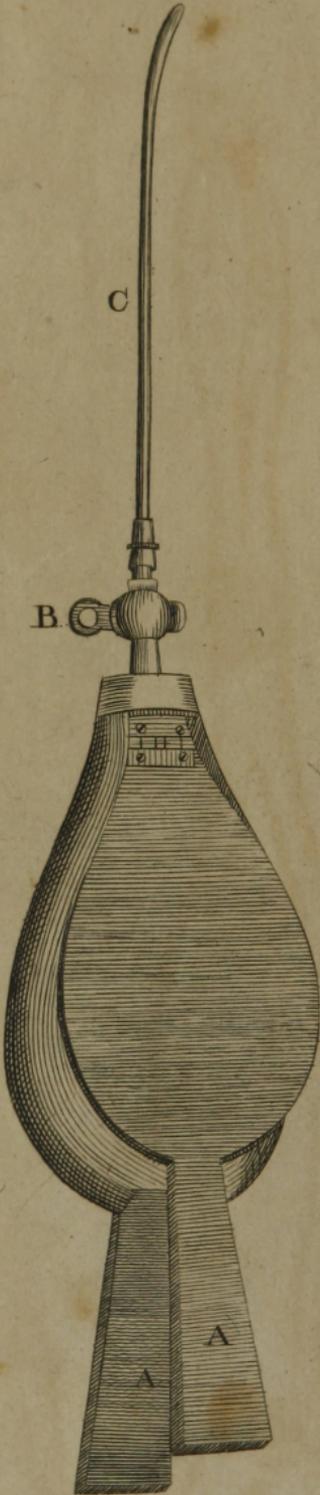


Fig. 2.

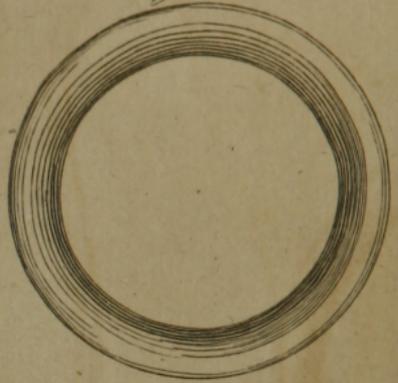


Fig. 3.



Fig. 4.

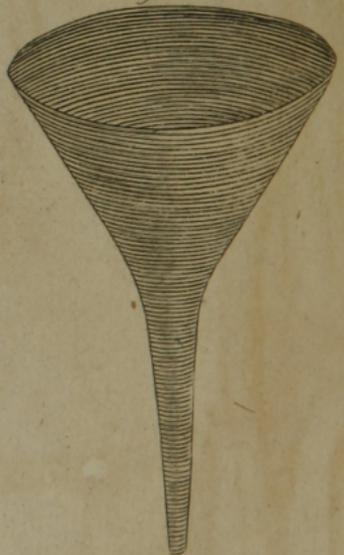


PLATE 10

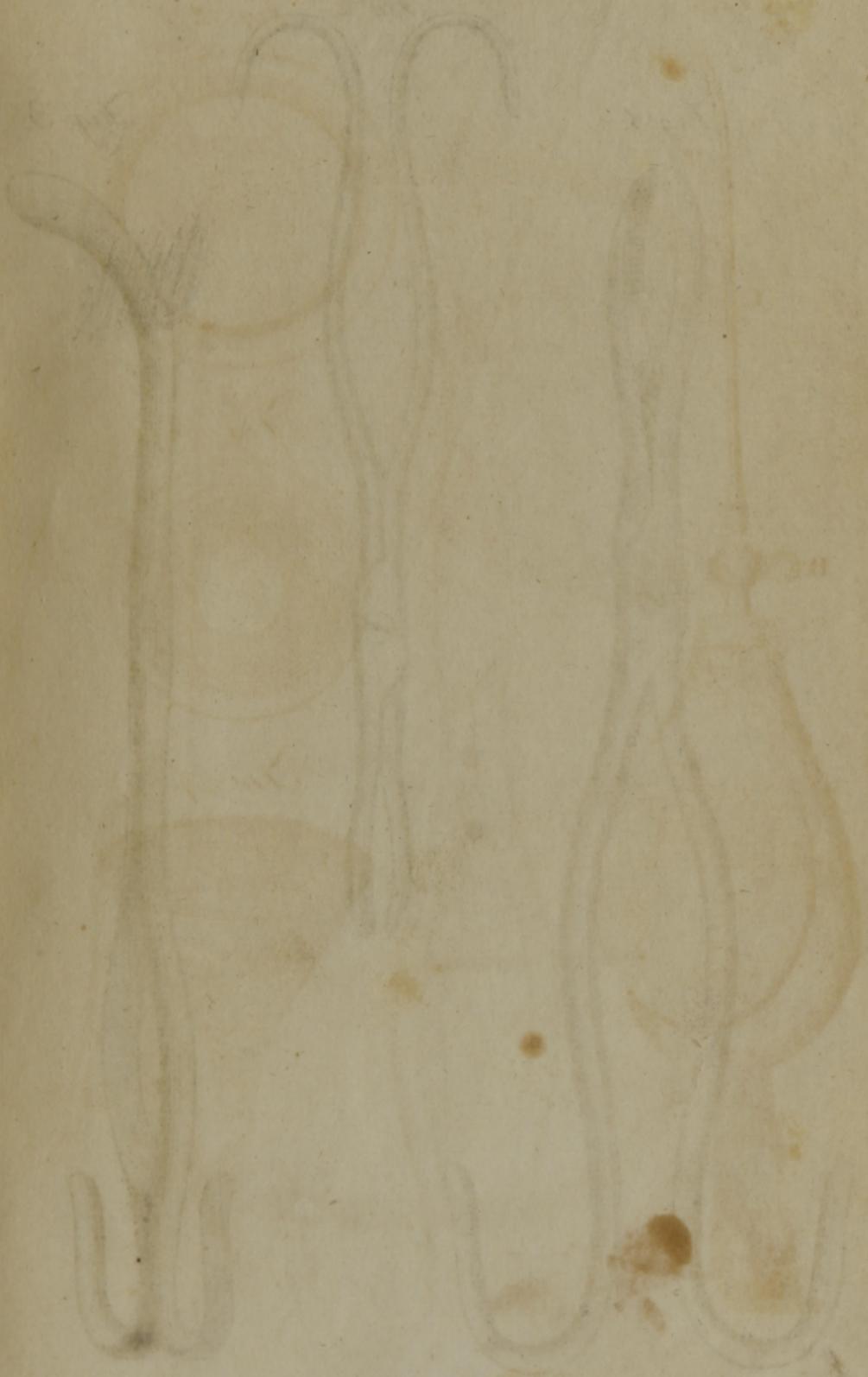


Fig. 2.

Fig. 1.

Fig. 3.

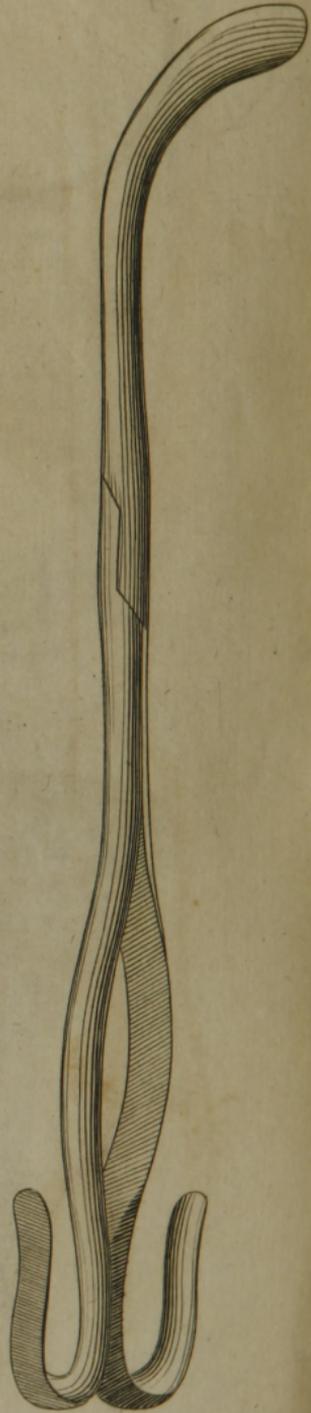
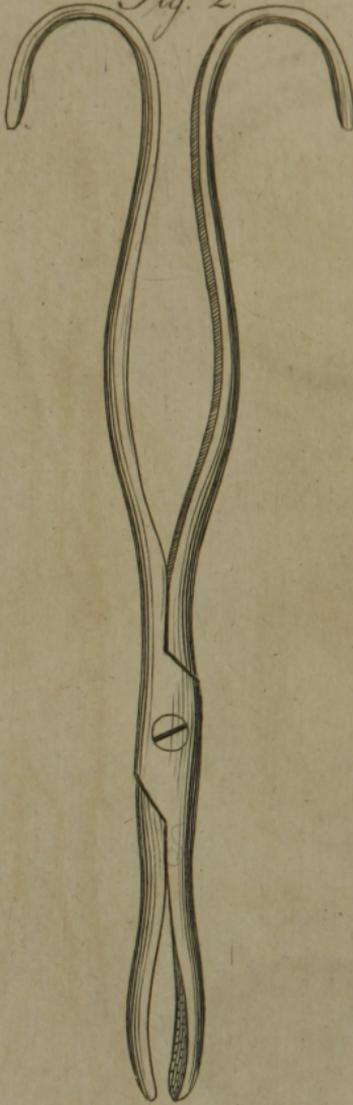
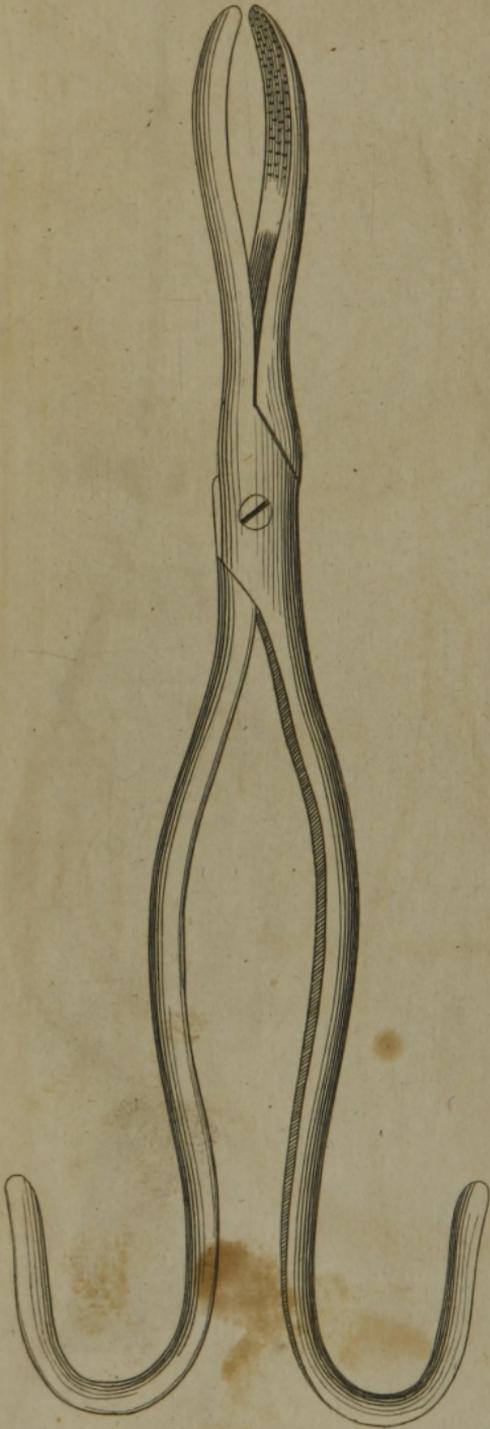


PLATE LXXVI

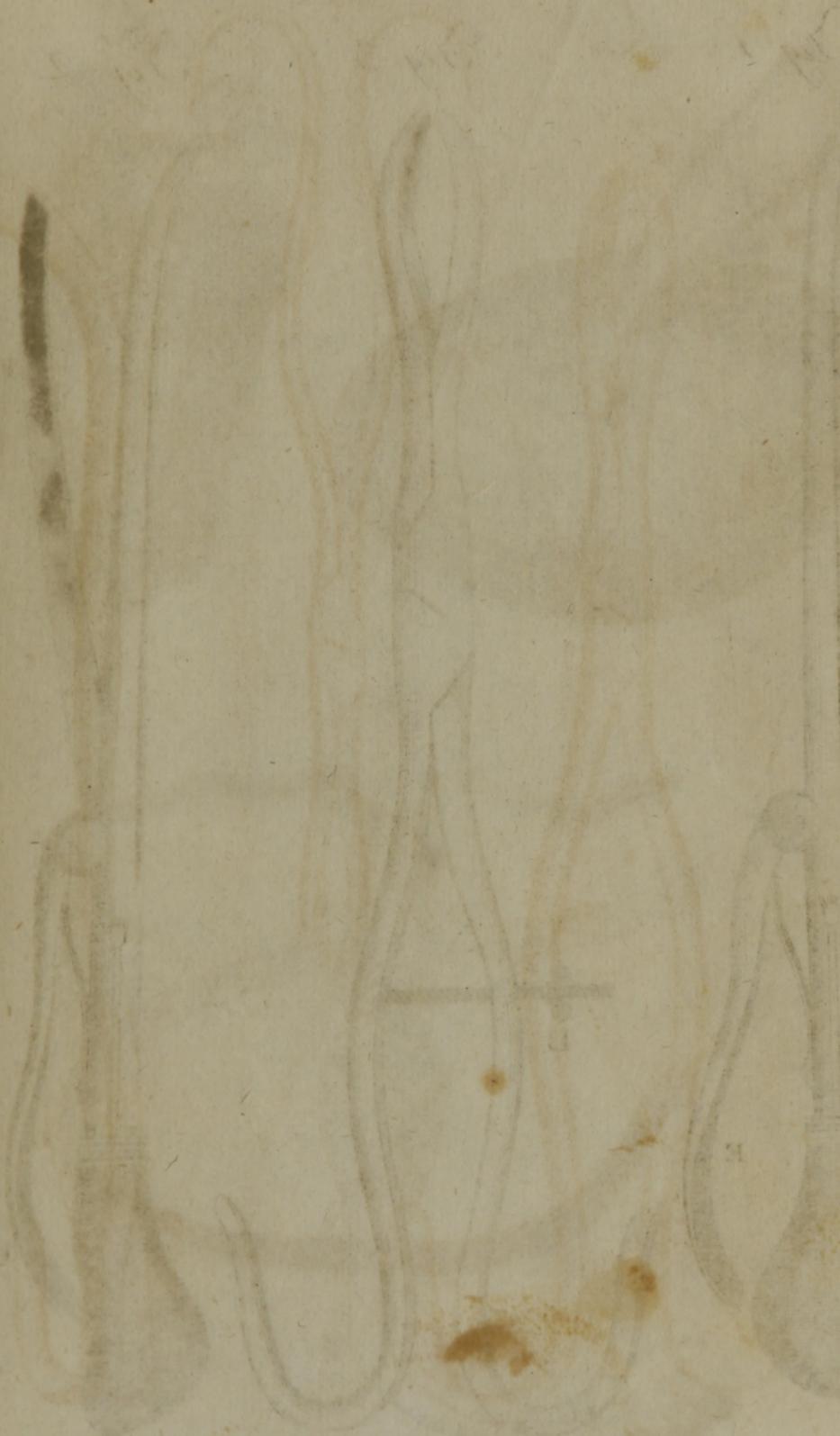


Fig. 1.

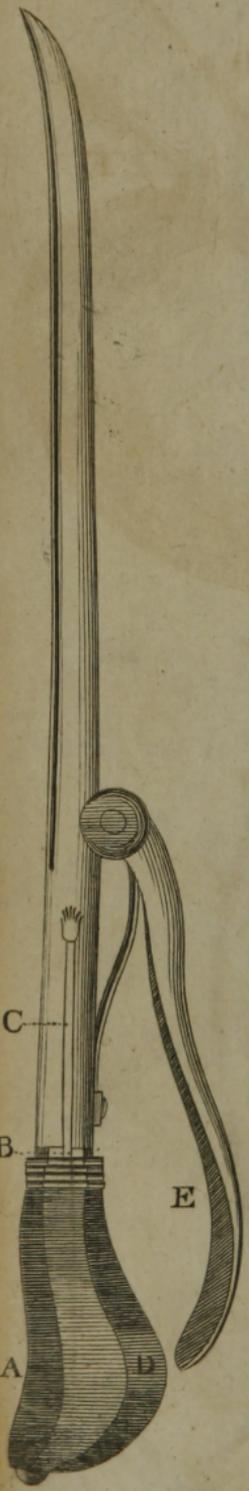


Fig. 3.

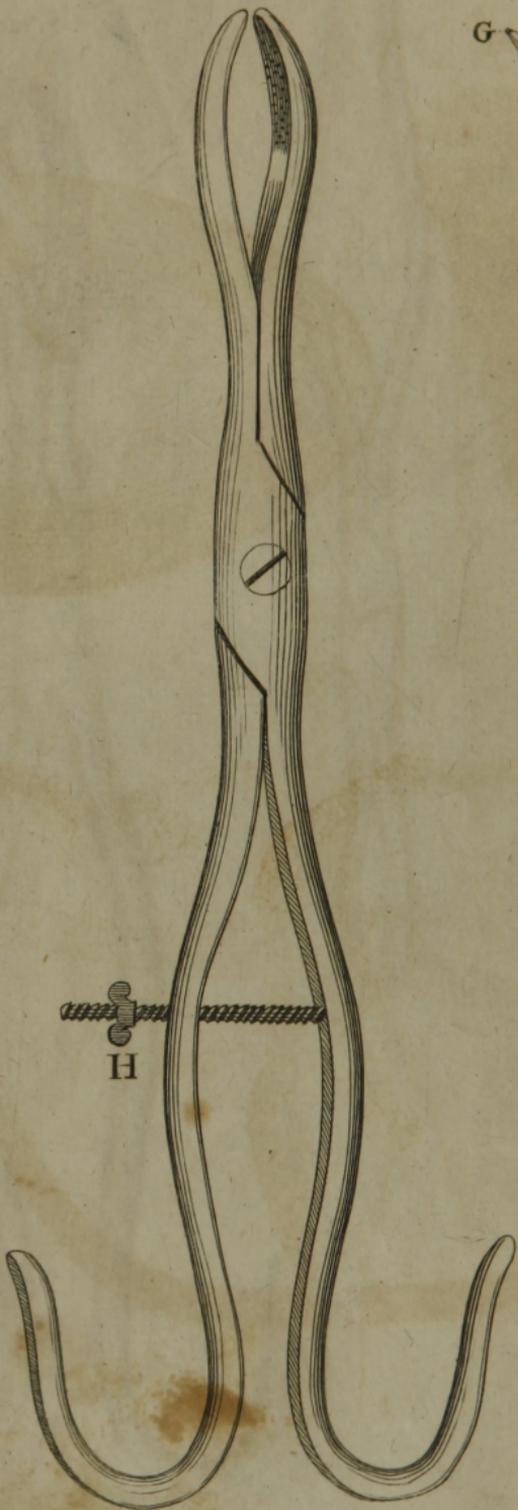


Fig. 2.

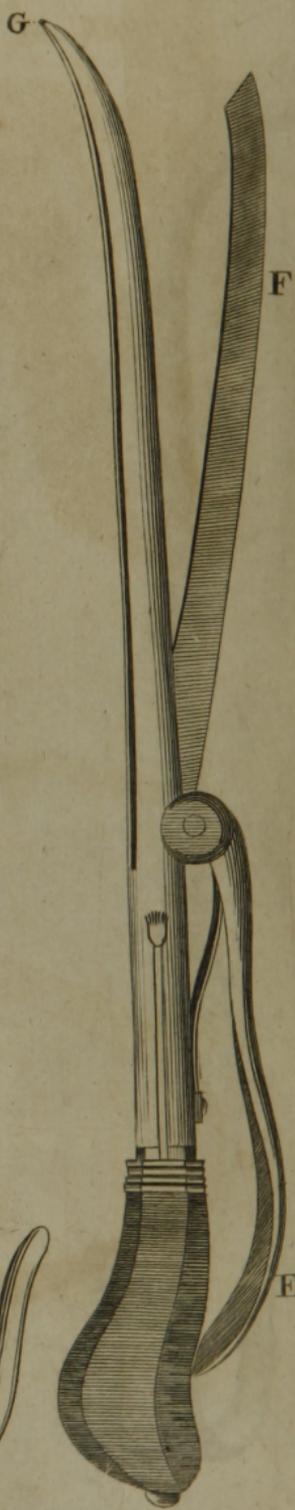


Fig. 1.

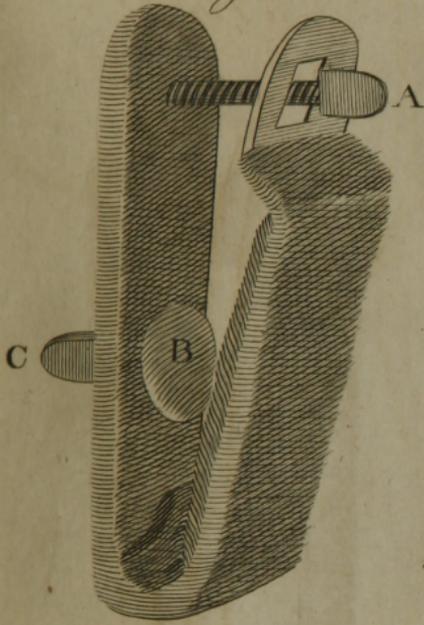


Fig. 2.



Fig. 3.

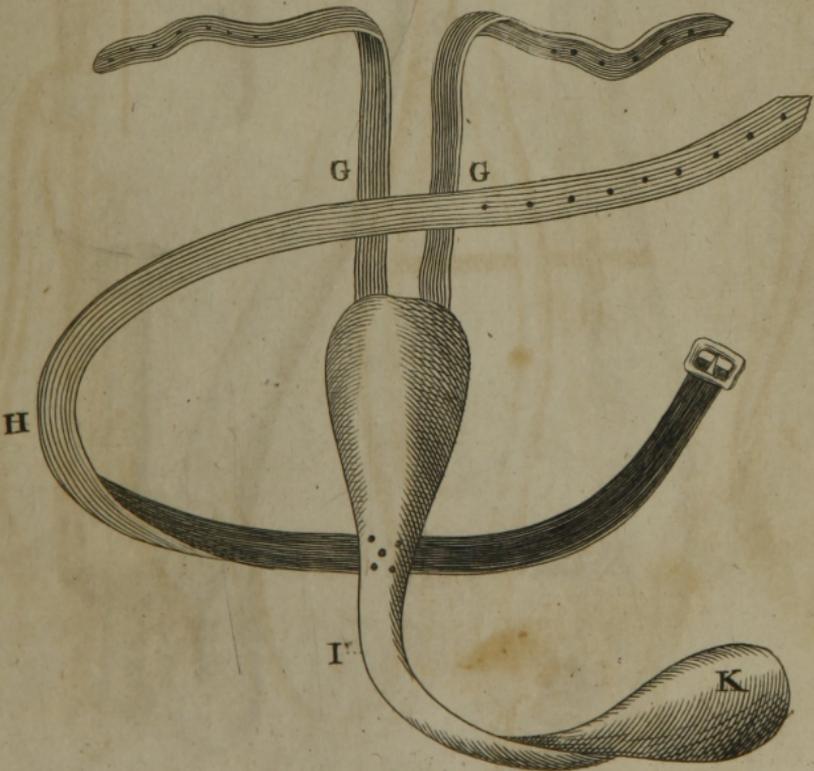


PLATE I

1777

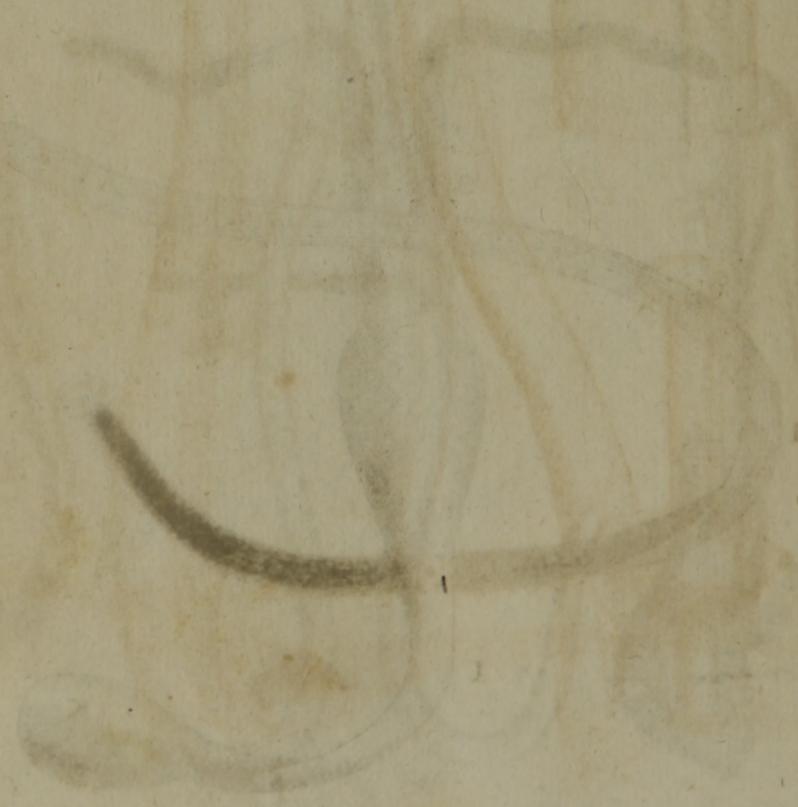


Plate LXXVIII

Fig. 1.

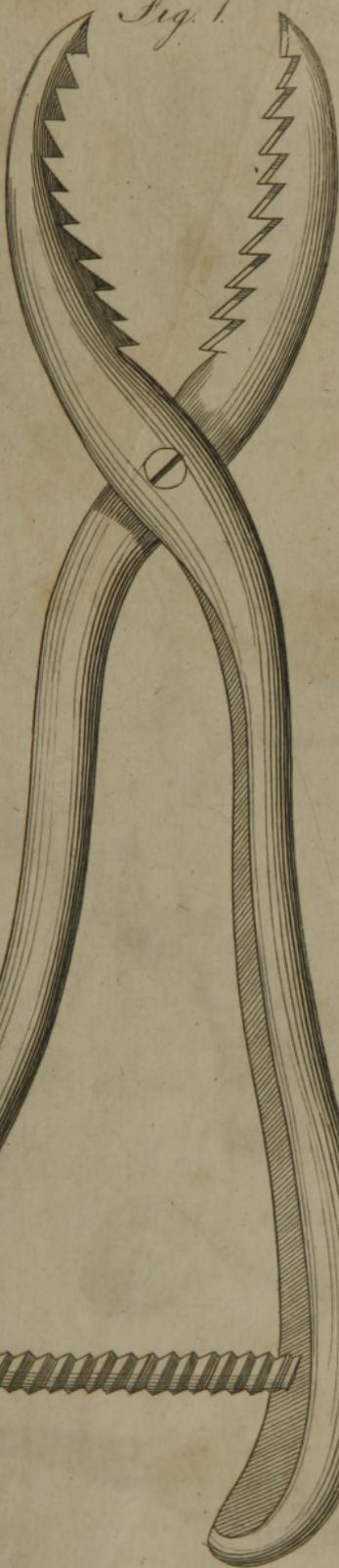


Fig. 2.

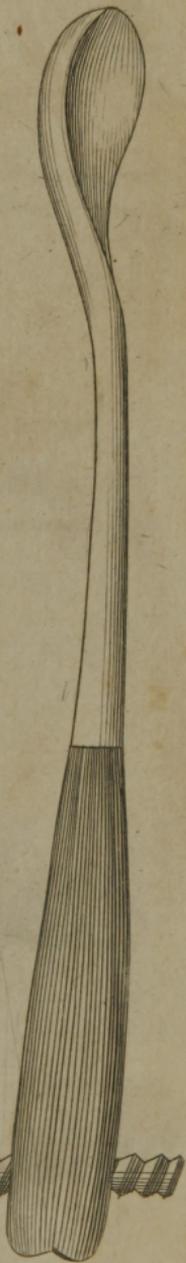


Fig. 3.

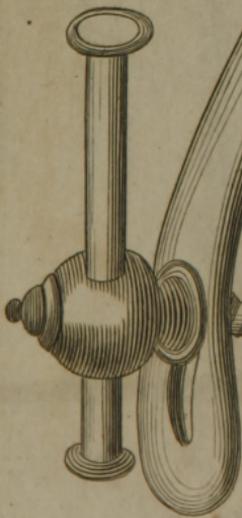
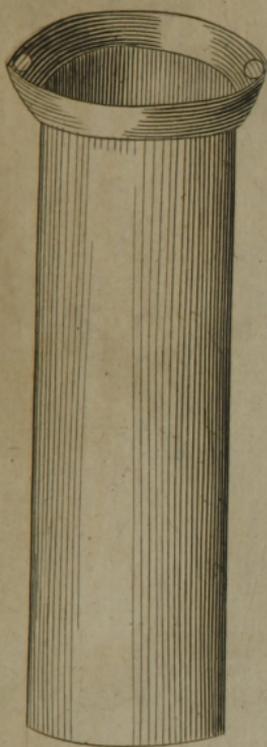


PLATE LXXVII



PLATE LXXIX

FIG. 1.

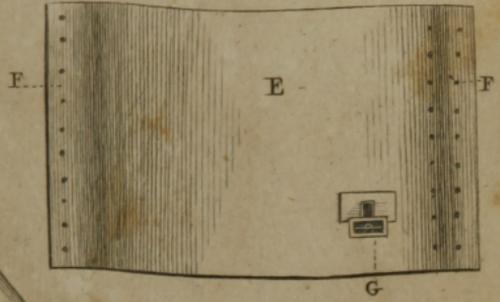


FIG. 2.



FIG.

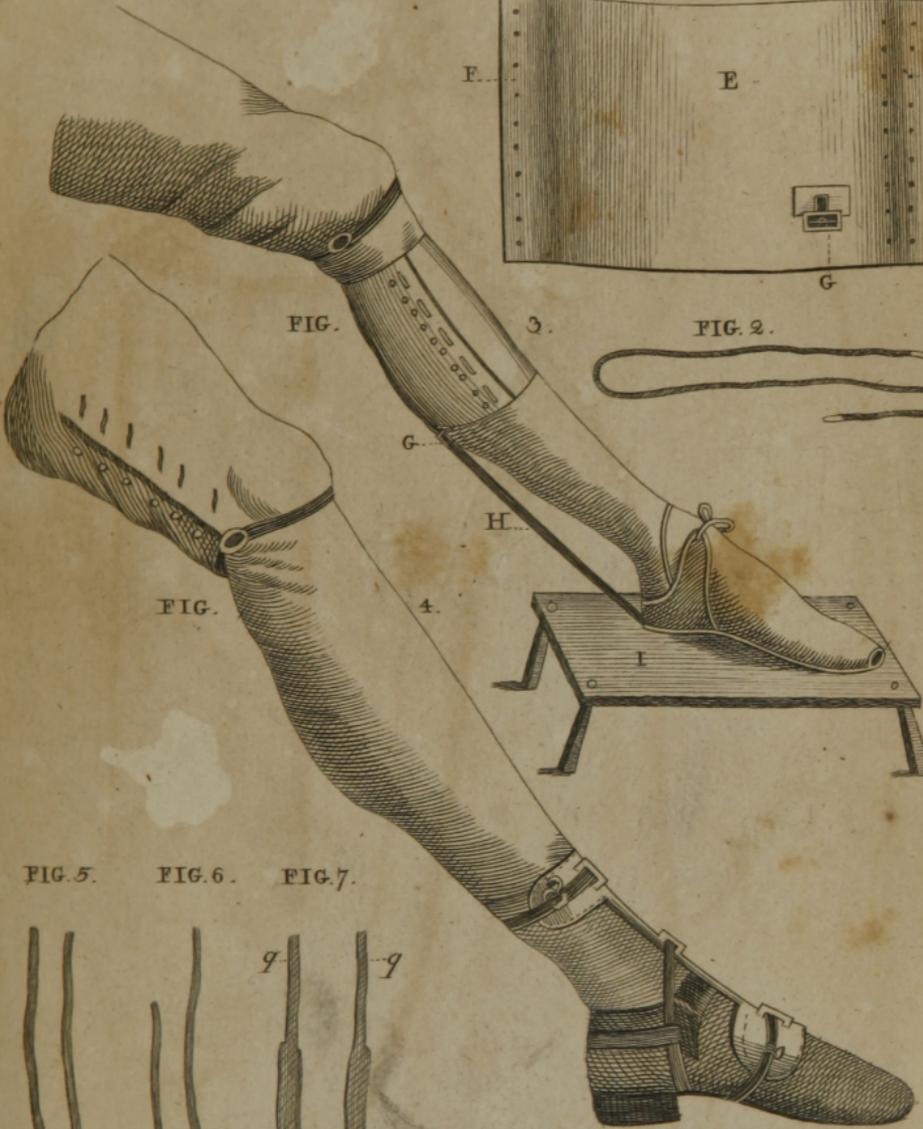


FIG.

FIG. 5.

FIG. 6.

FIG. 7.



FIG. 8.



FIG. 9.







PLATE LXXXI

FIG. 1.



FIG. 2.

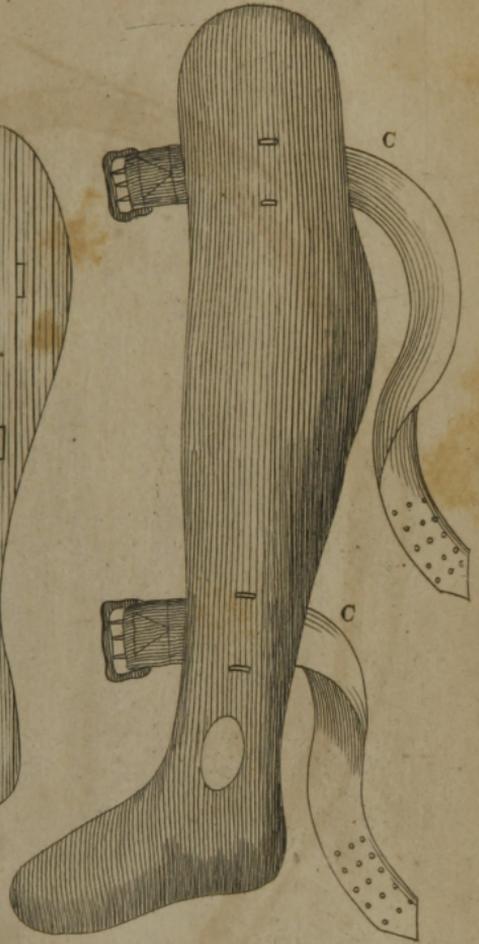


FIG. 3.

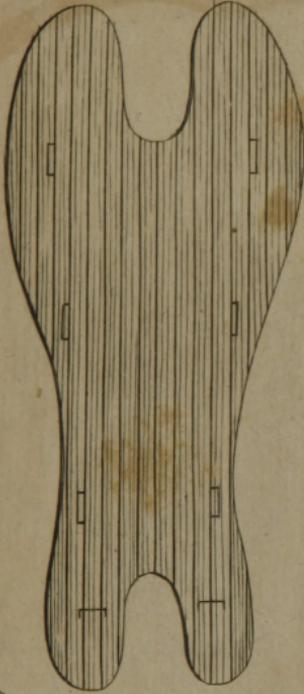


FIG. 4.

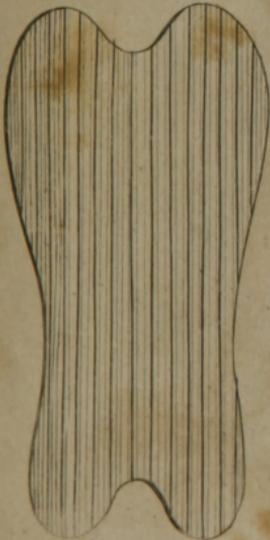


FIG. 5.



FIG. 6.







PLATE LXXMI.

FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.

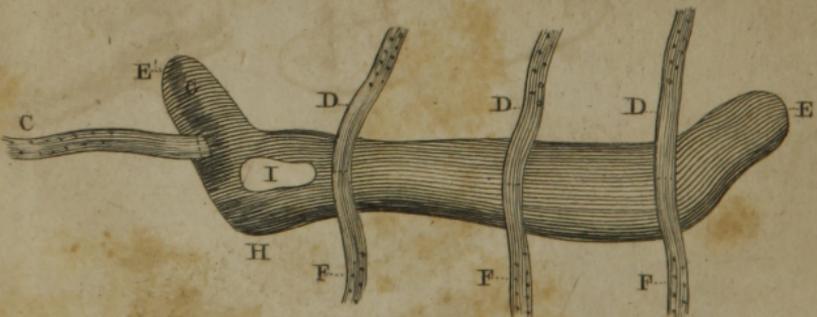


PLATE LXXXIII

FIG. 3.

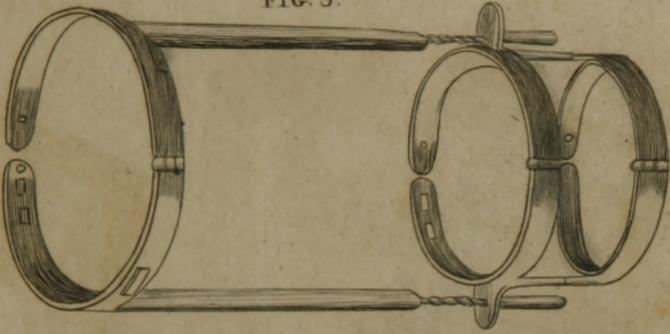


FIG. 4.

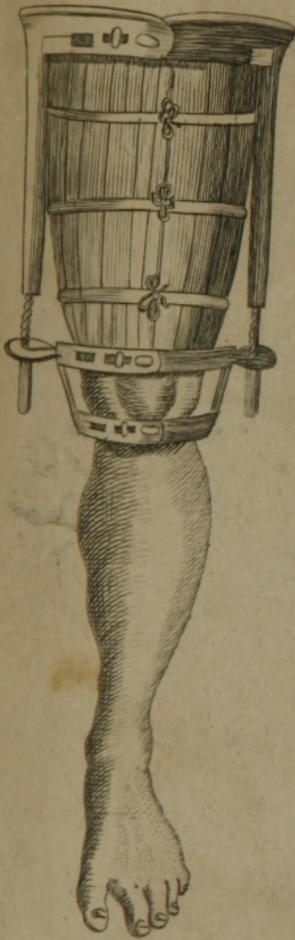


FIG. 1.

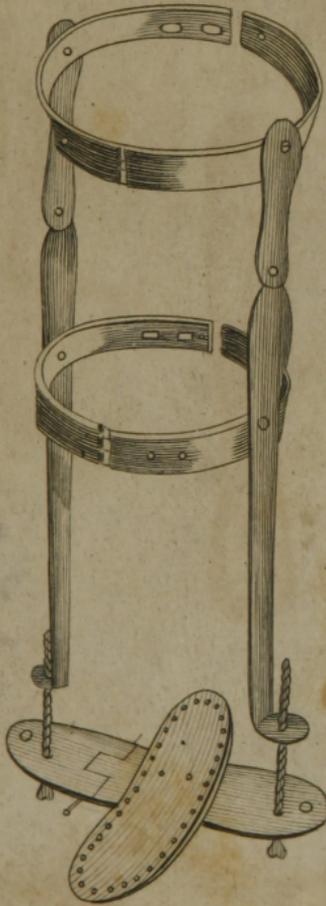


FIG. 2.



FIG. 5.



PLATE XXXIII
183



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FIG. 1.

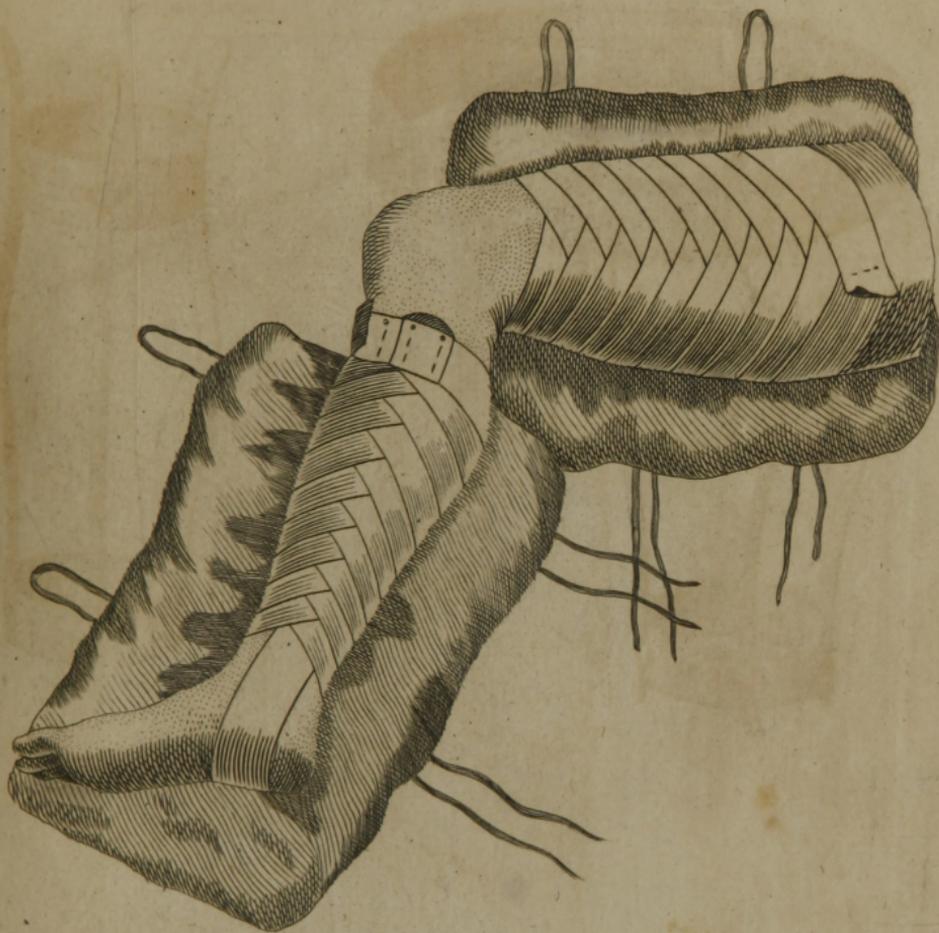


FIG. 2.



PLATE XXXII

FIG. 1

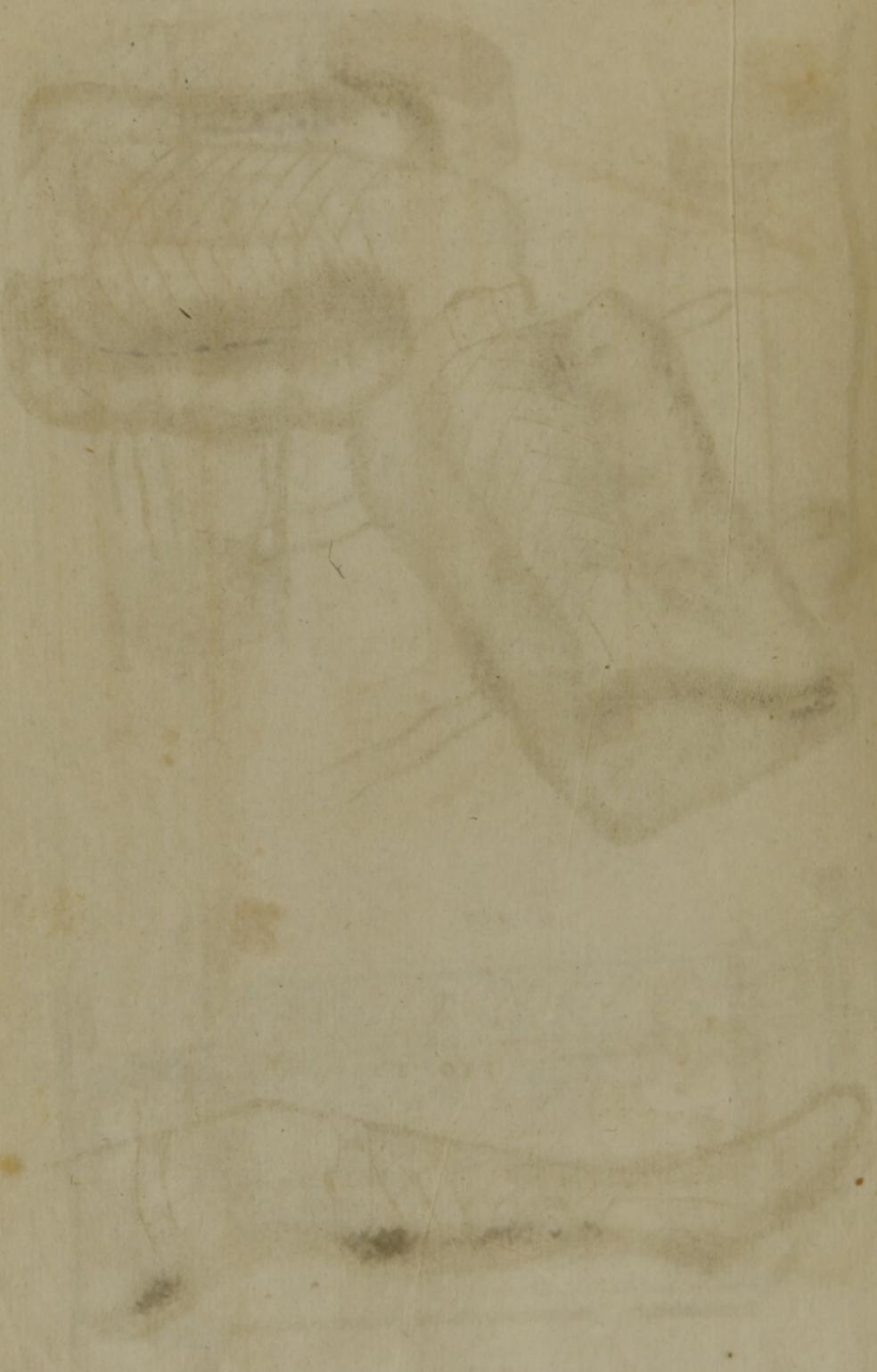


PLATE LXXXVI

FIG. 1.

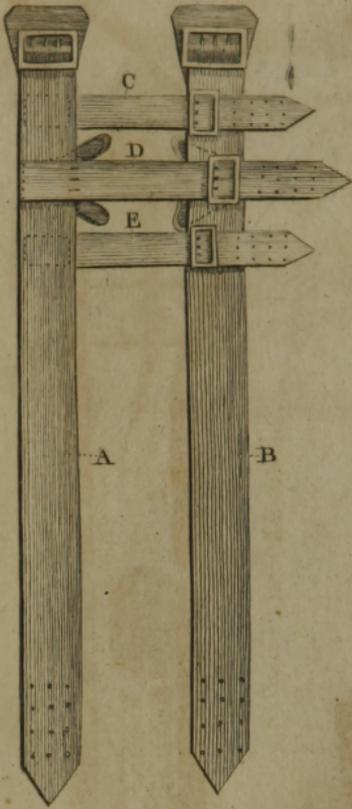


FIG. 2.

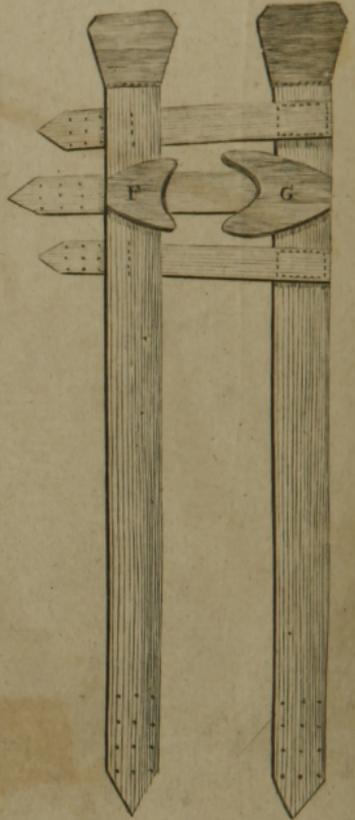


FIG. 3.

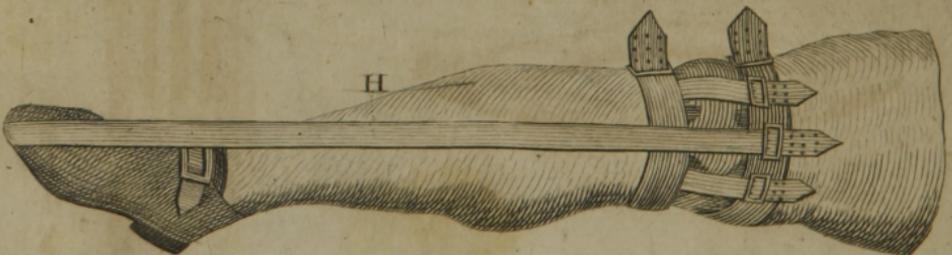


PLATE LXXXVII

FIG. 1.

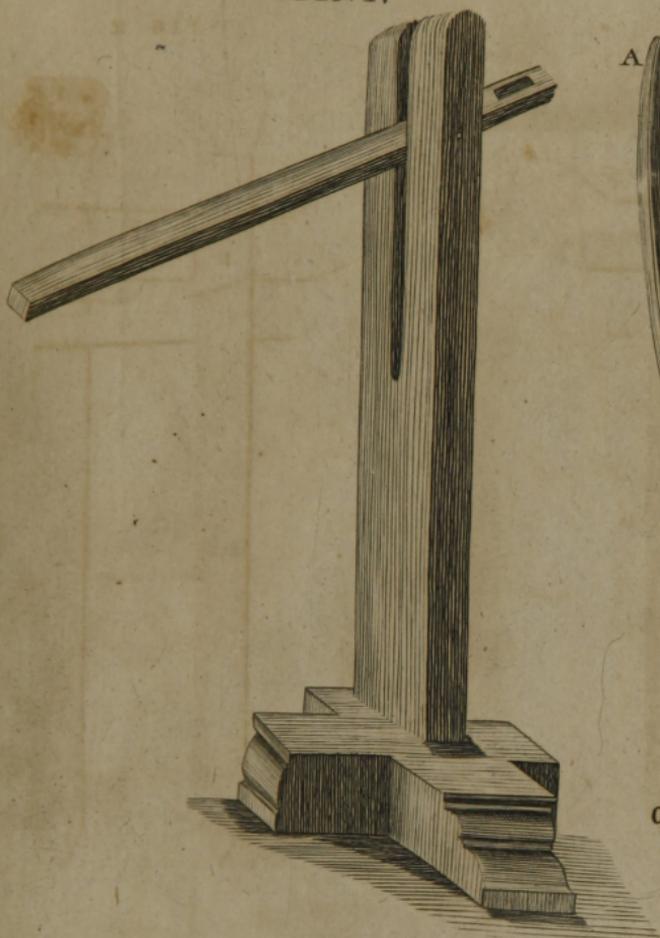


FIG. 2.



FIG. 3.



PLATE XXVII

FIG. 3

FIG. 4



H H

PLATE I

Fig. 1

Fig. 2

Fig. 3



PLATE LXXXVIII

FIG. 1.



FIG. 2.



FIG. 3.



PLATE LXXXIX.

FIG. 1.

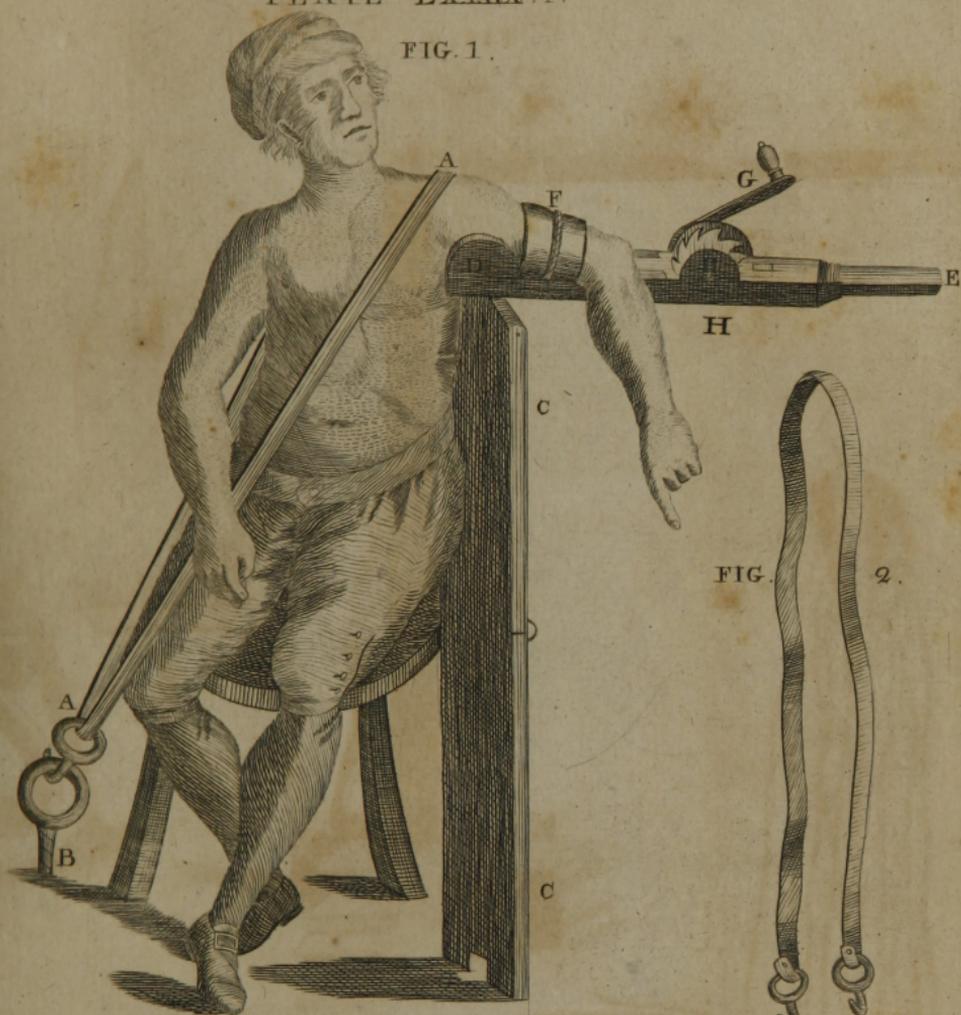


FIG. 2.



FIG. 5.



FIG. 3.

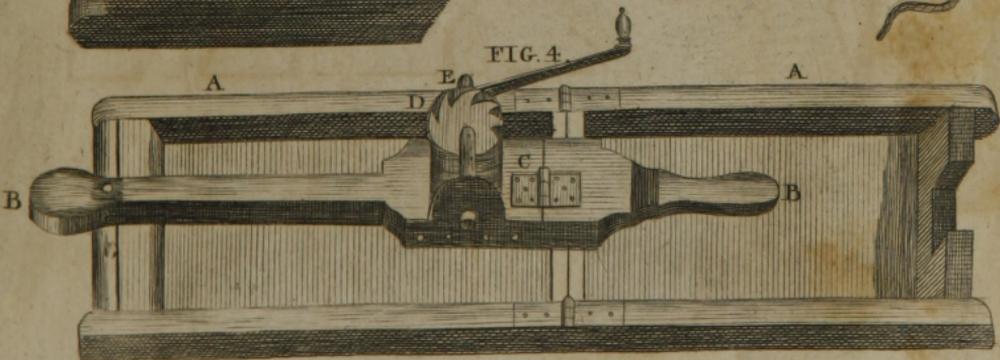
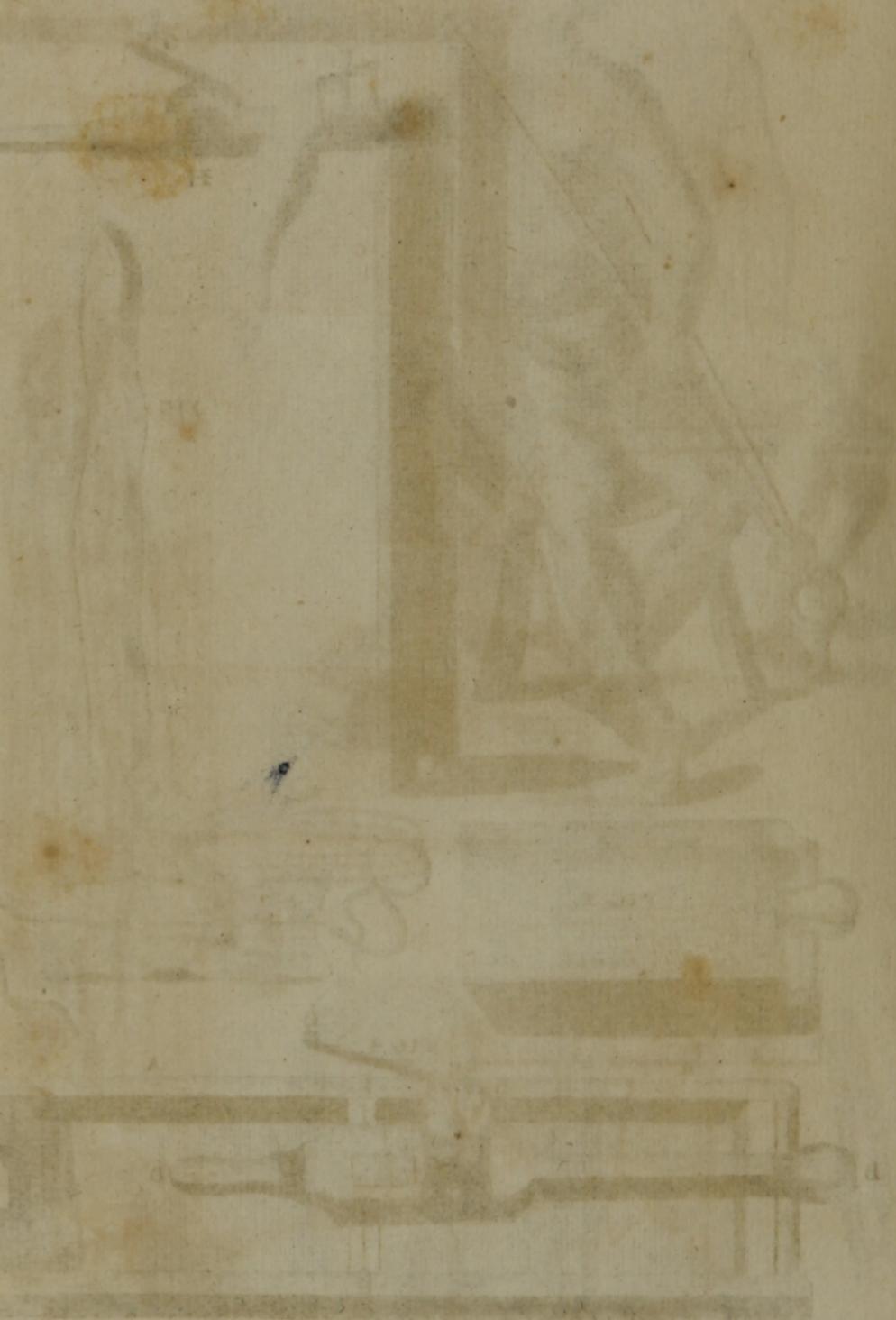


FIG. 4.

PLATE I

Fig. 1



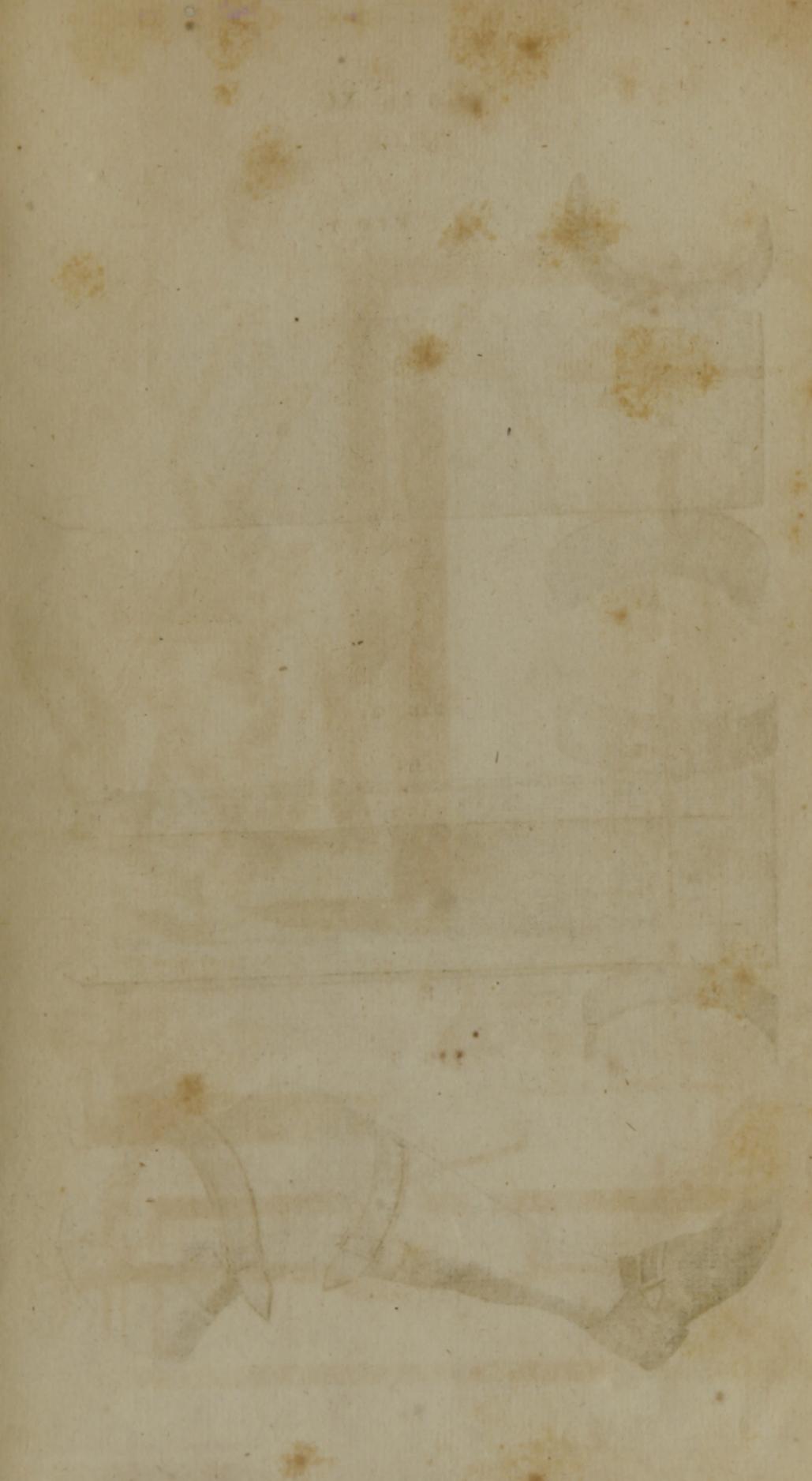


FIG. 1.

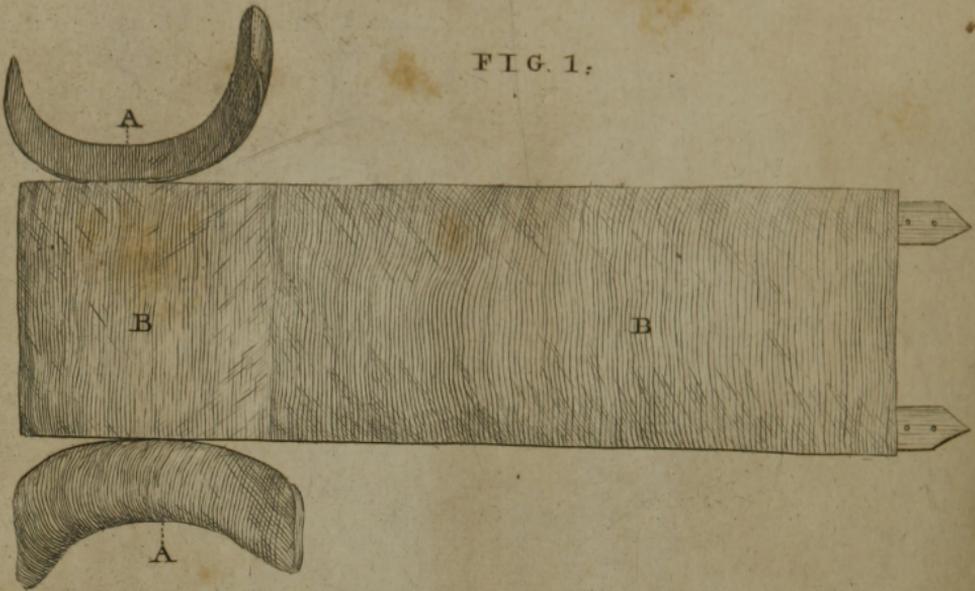


FIG. 2.

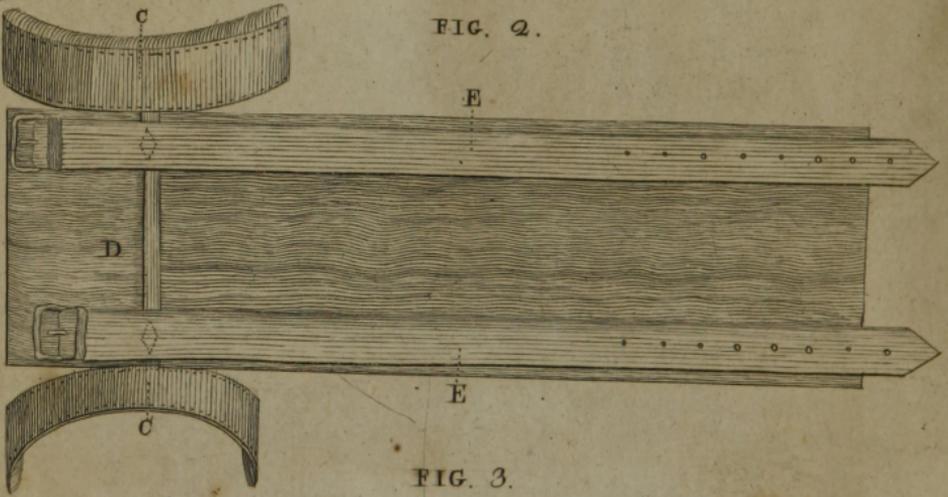
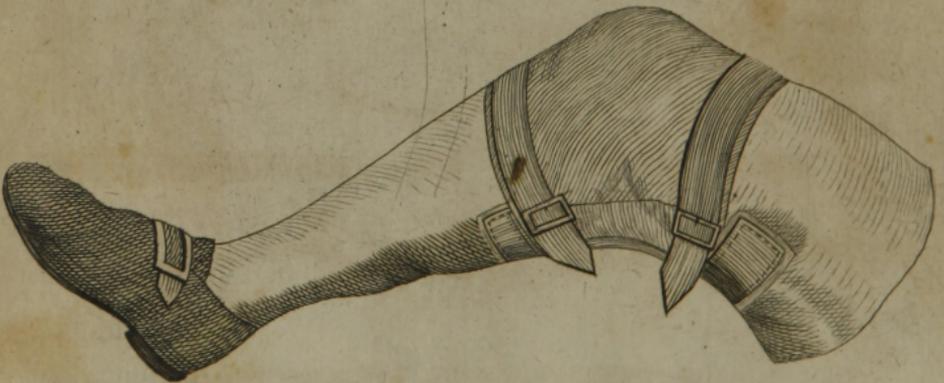


FIG. 3.



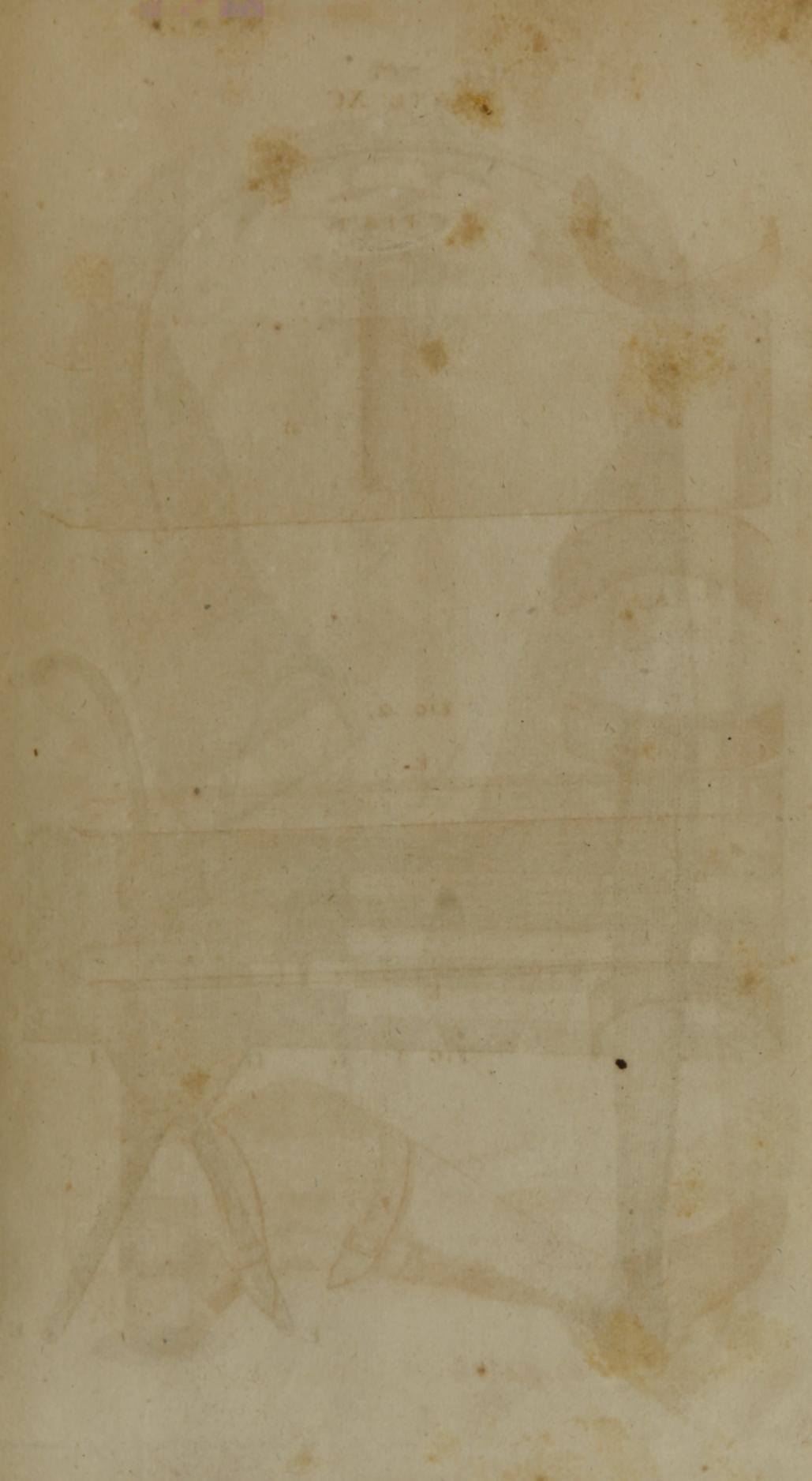
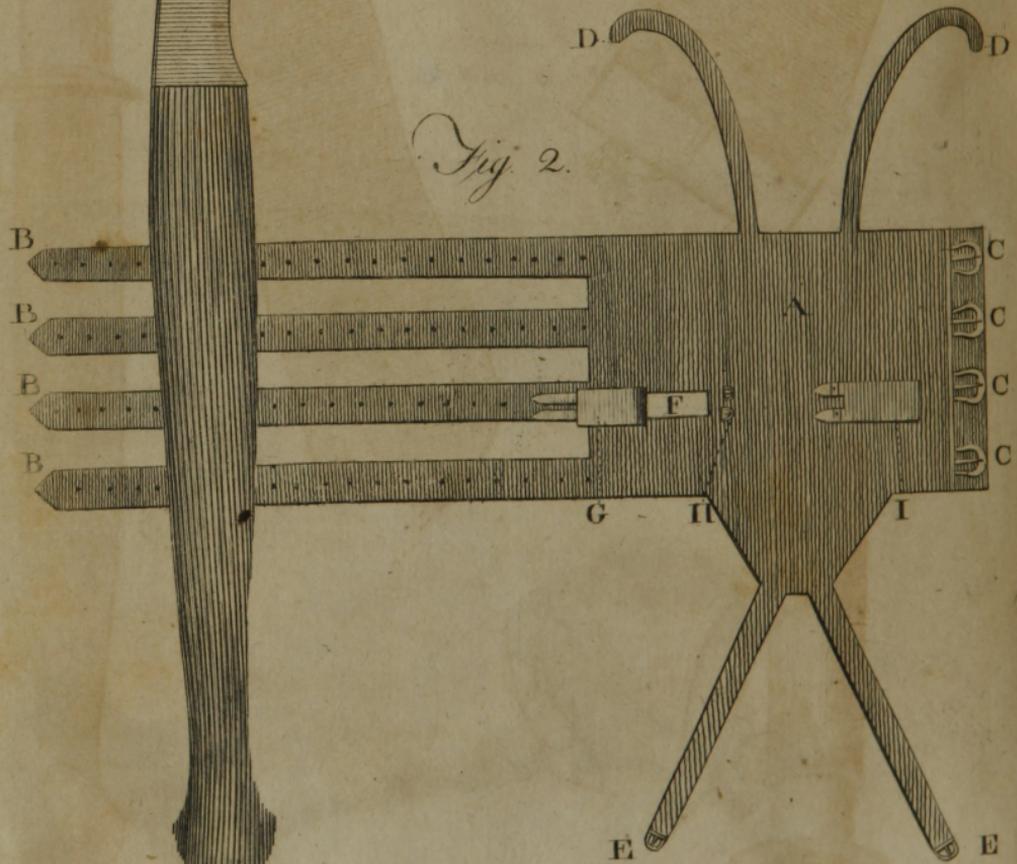


Fig. 1.



Fig. 2.



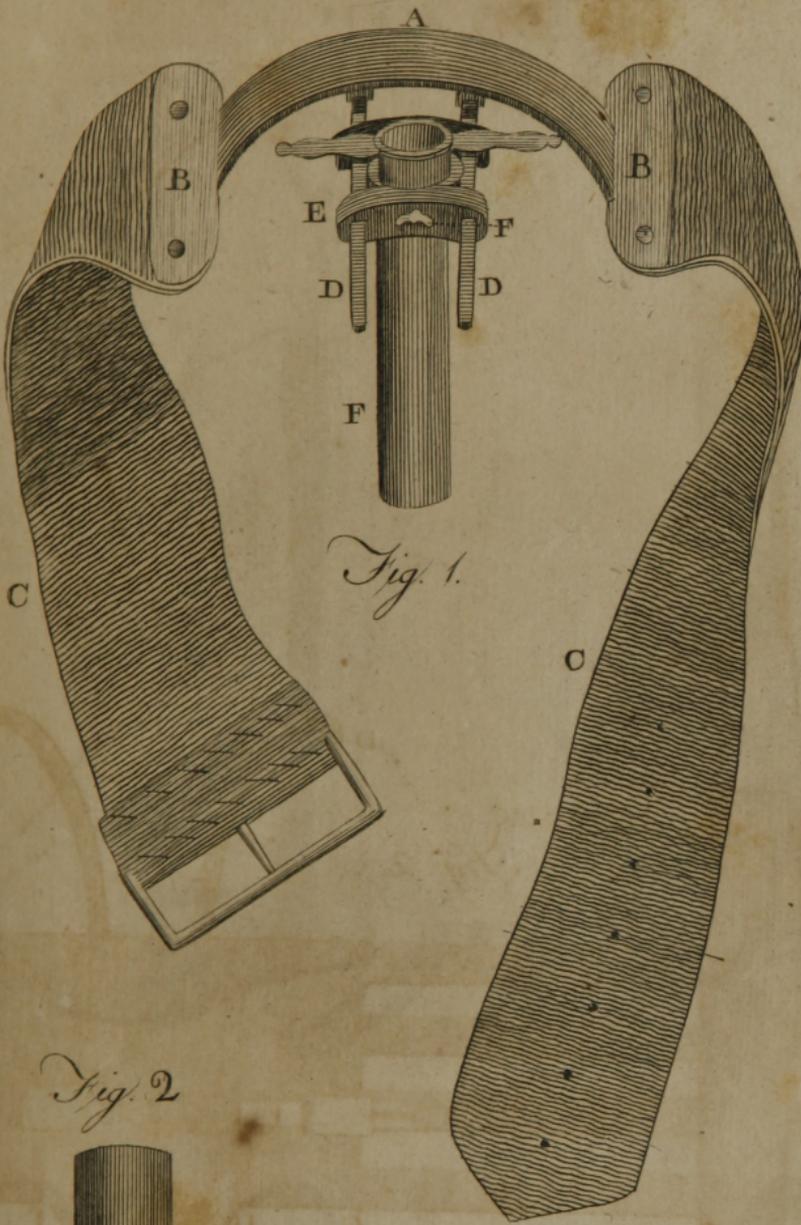


Fig. 3



Fig. 2



PLATE VII

Fig. 1

Fig. 2

Fig. 3

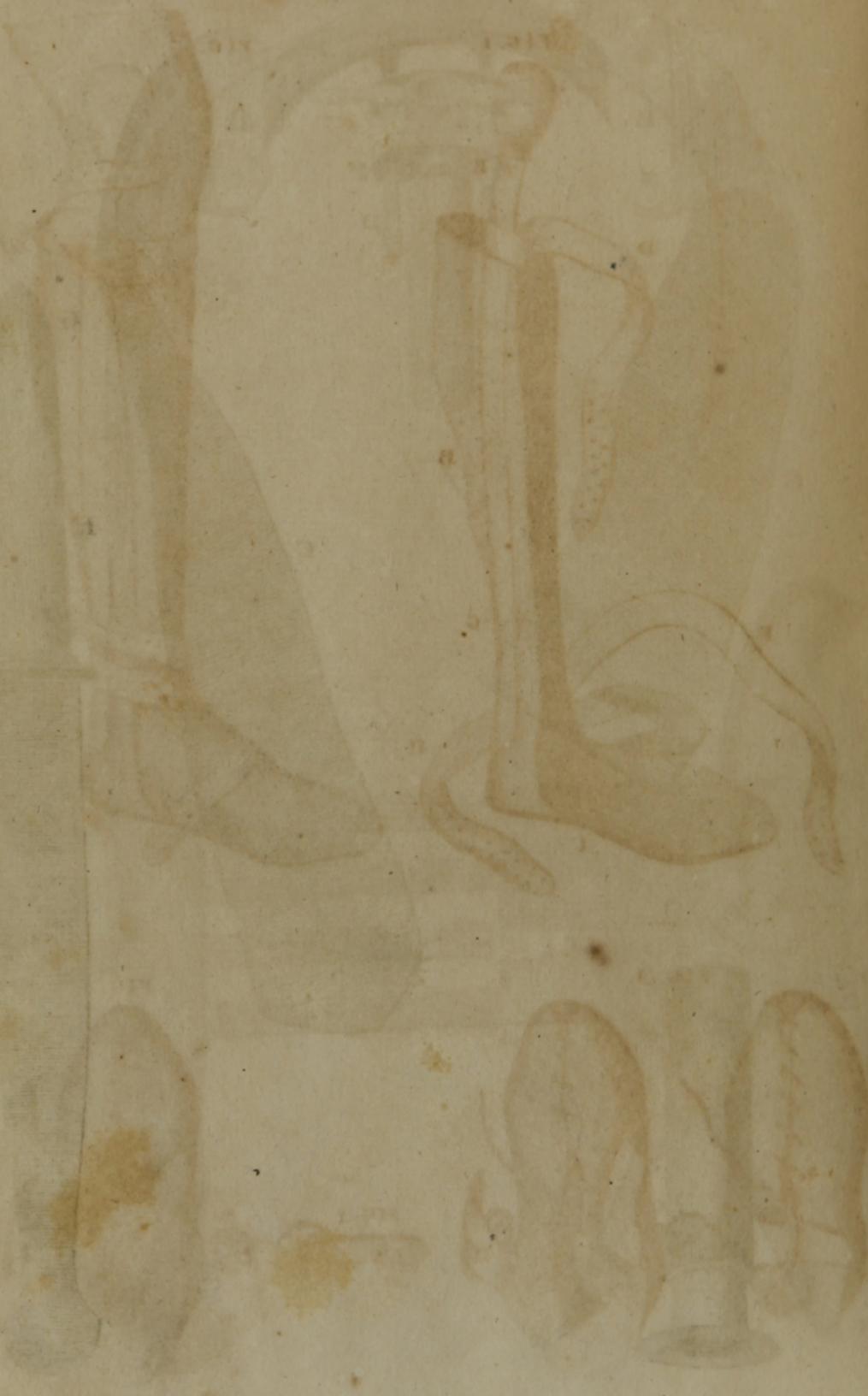


PLATE XCIII.

FIG. 1.

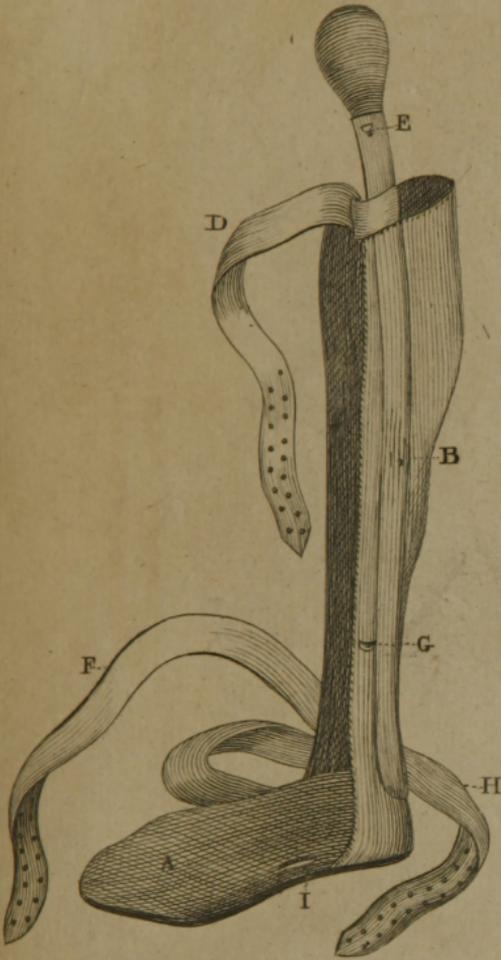


FIG.

2.



FIG. 3.

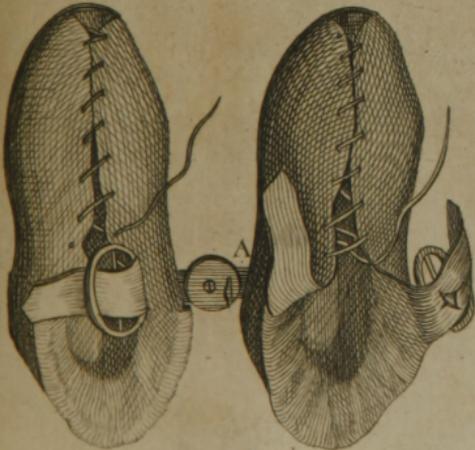
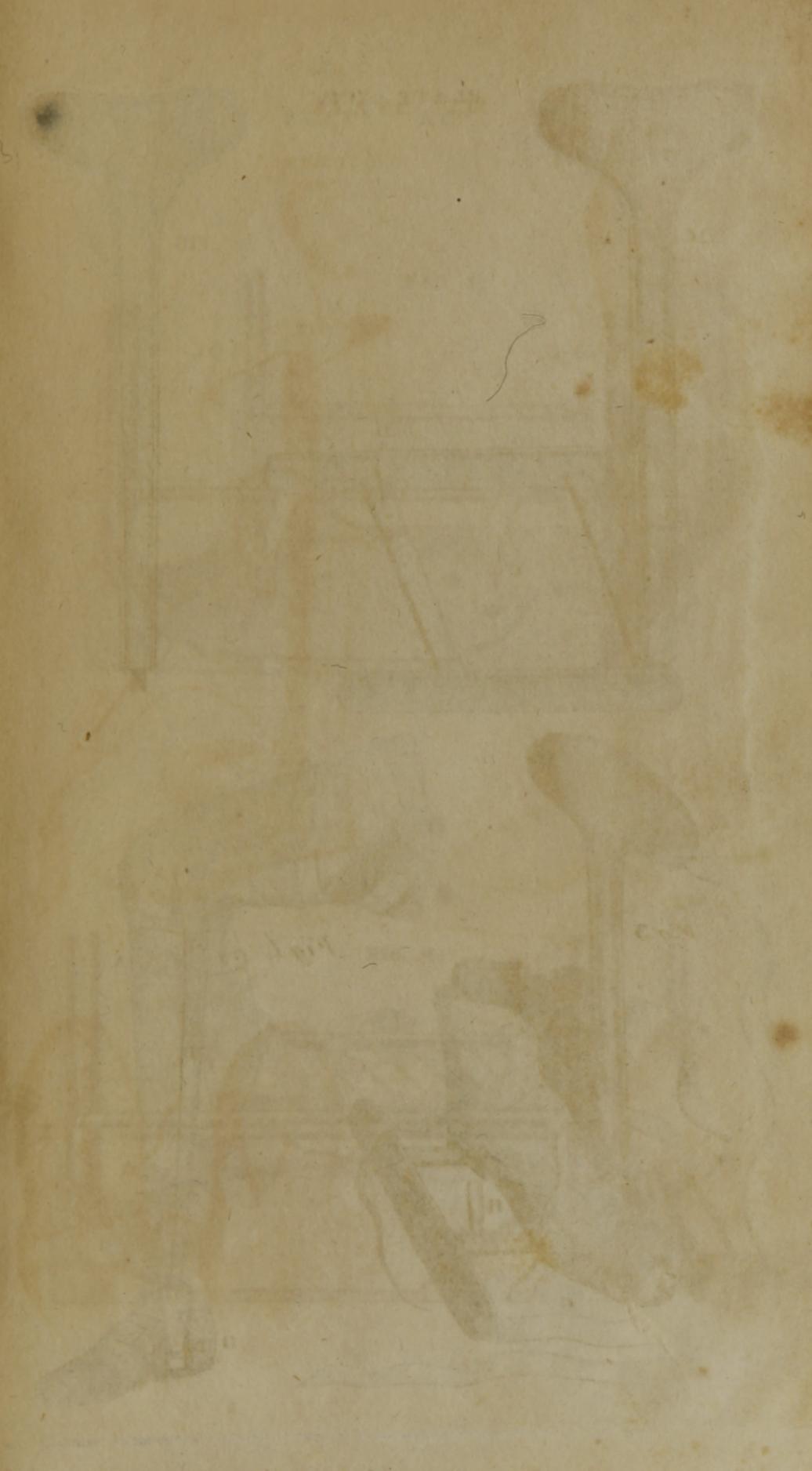


FIG. 4.



FIG. 5.





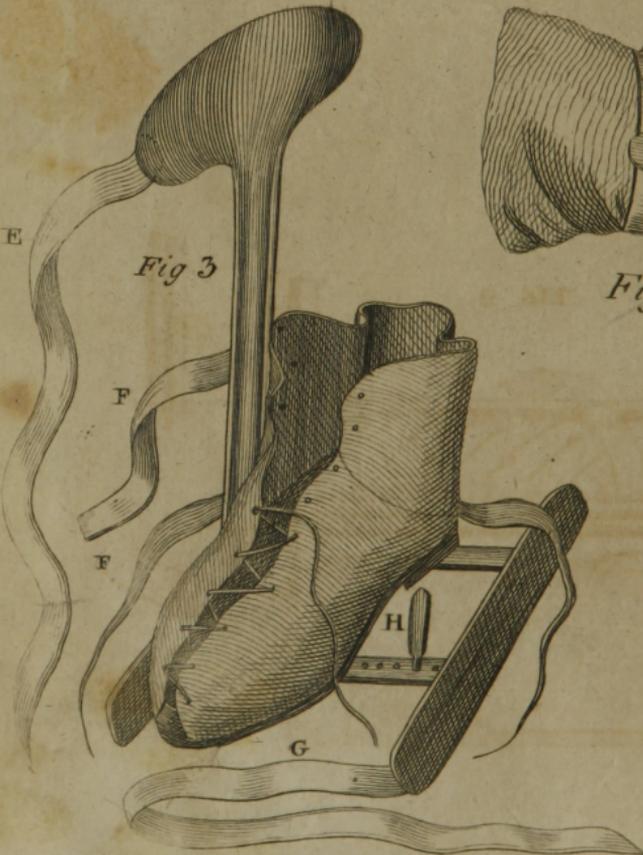
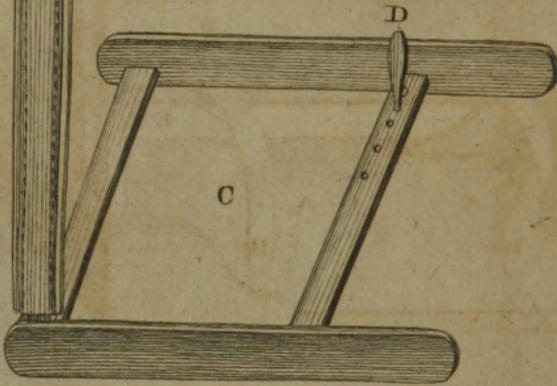
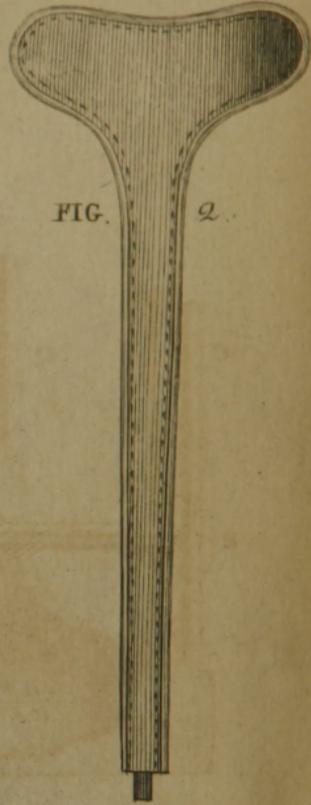


FIG. 1.

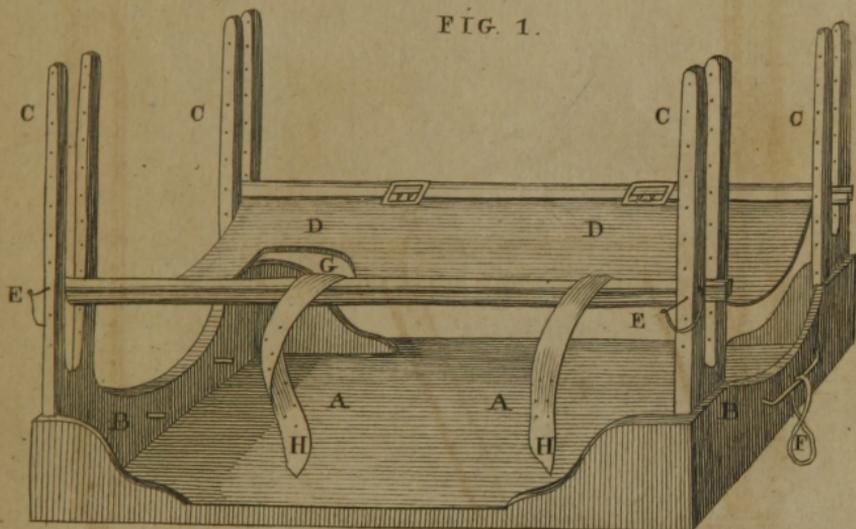
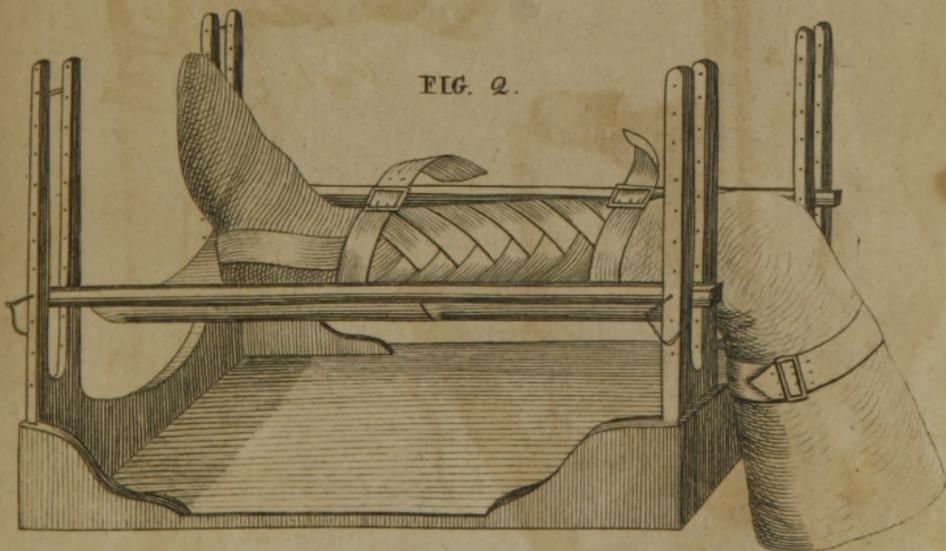


FIG. 2.

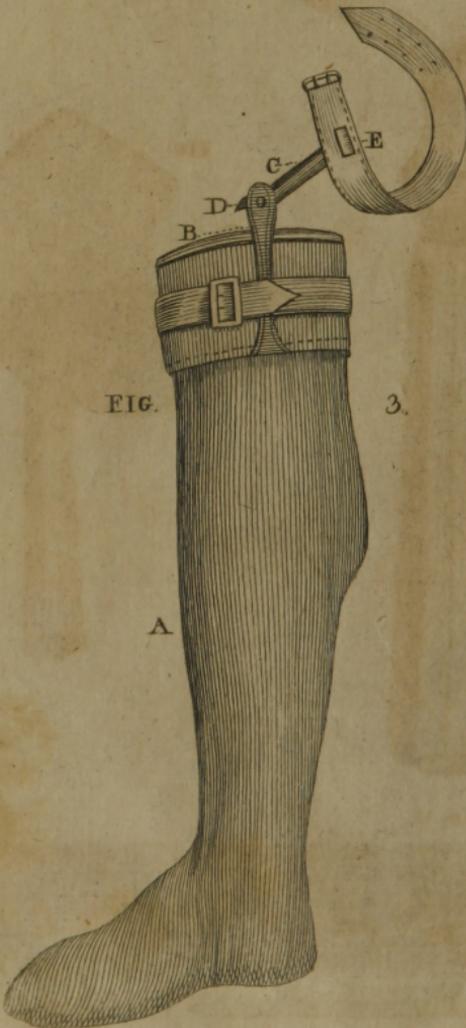
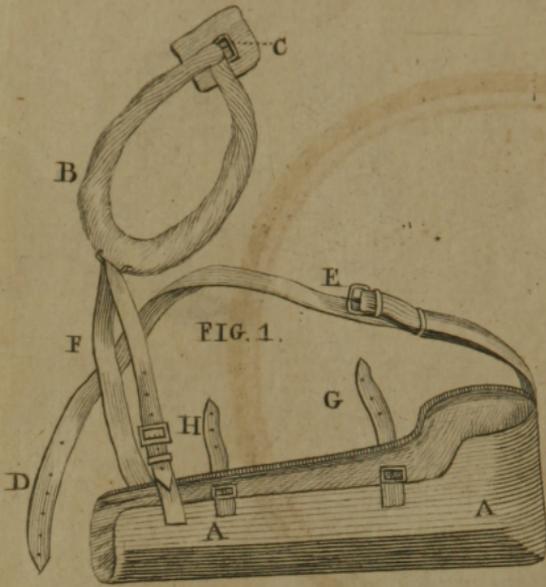


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PLATE XCVI



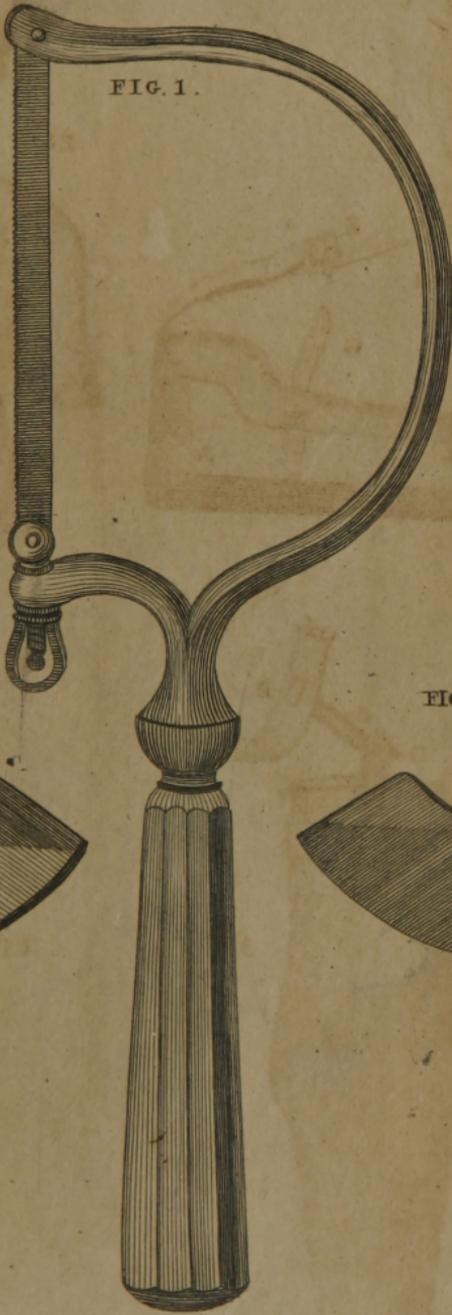


FIG. 4.



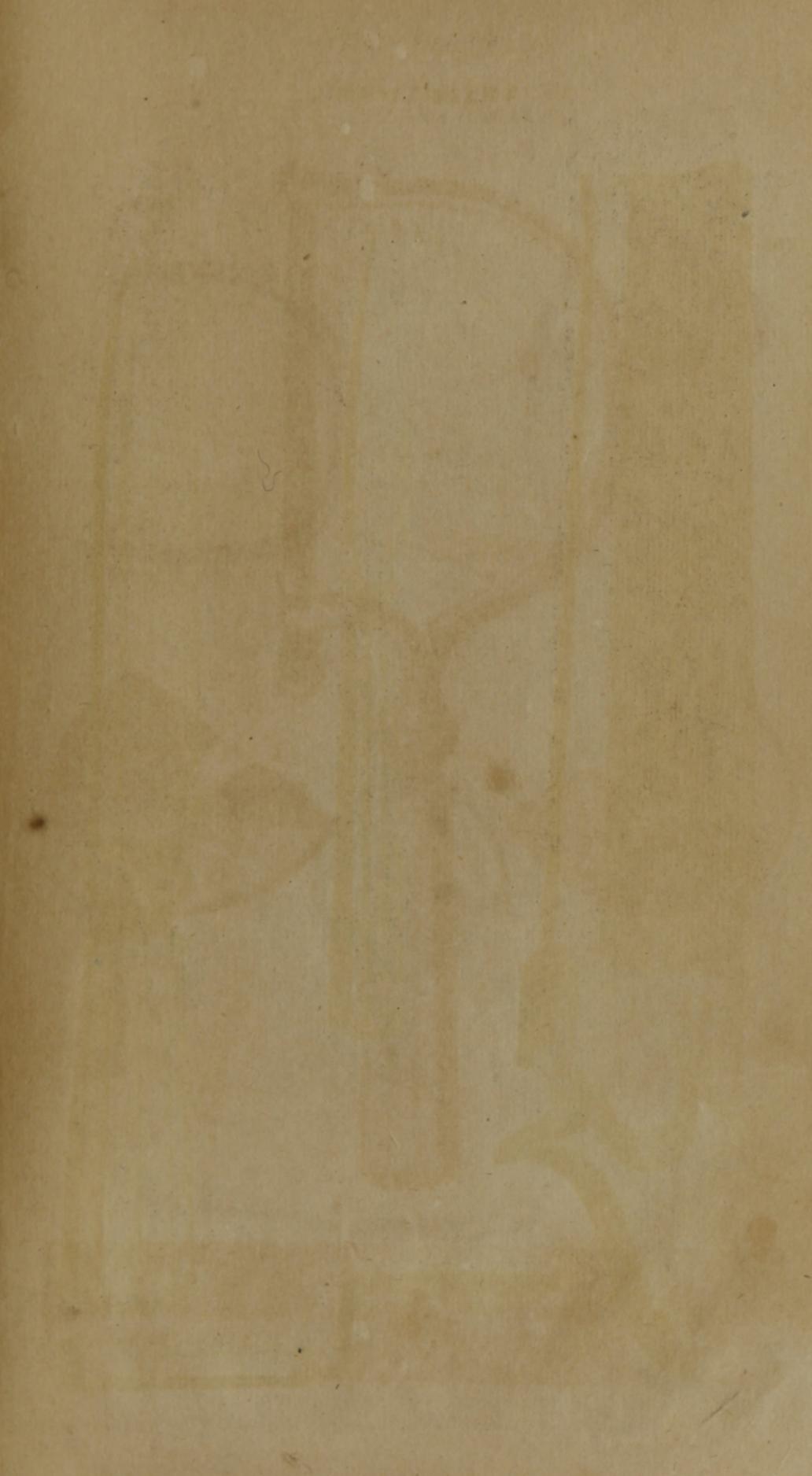


PLATE XCVIII

FIG.

1.

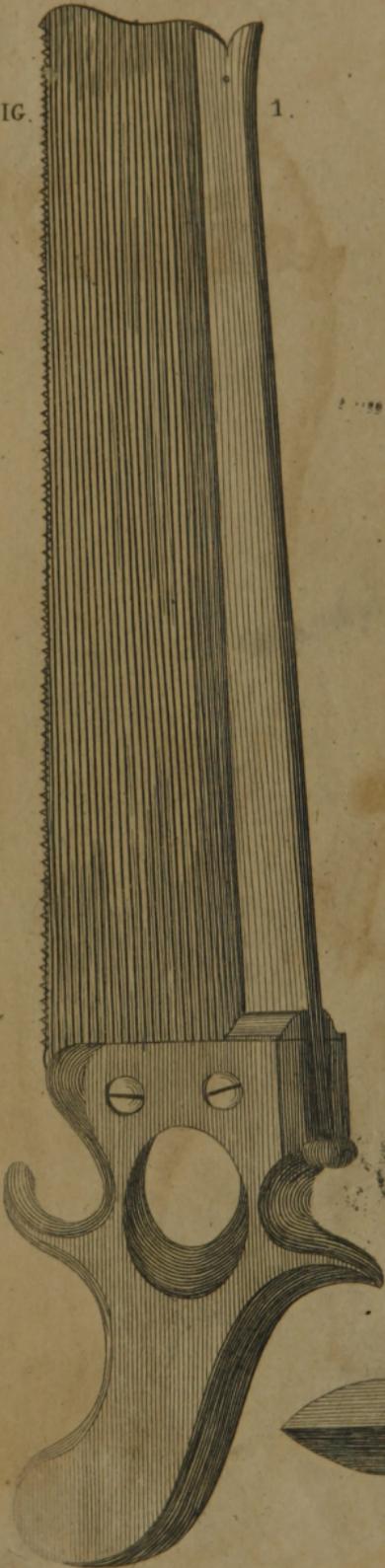


FIG.

2.



FIG.

3.



FIG. 4.

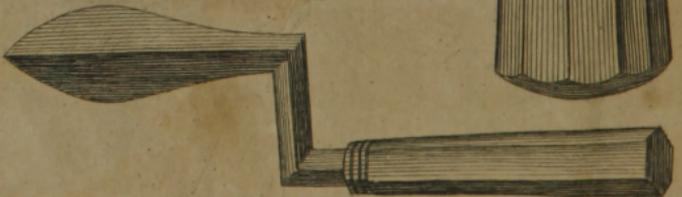


PLATE XCIX

FIG. 1.

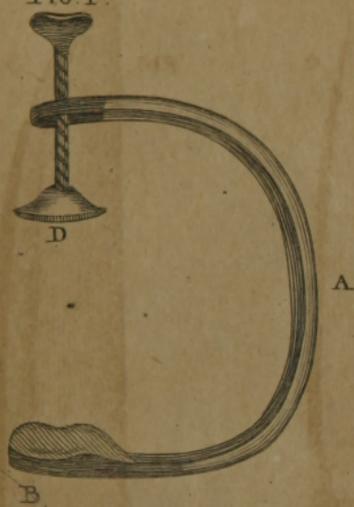


FIG. 2.



FIG. 3.

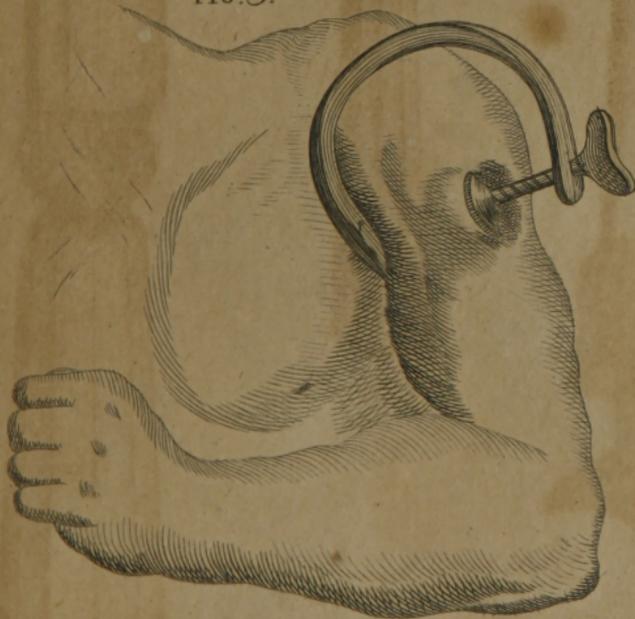




PLATE CI

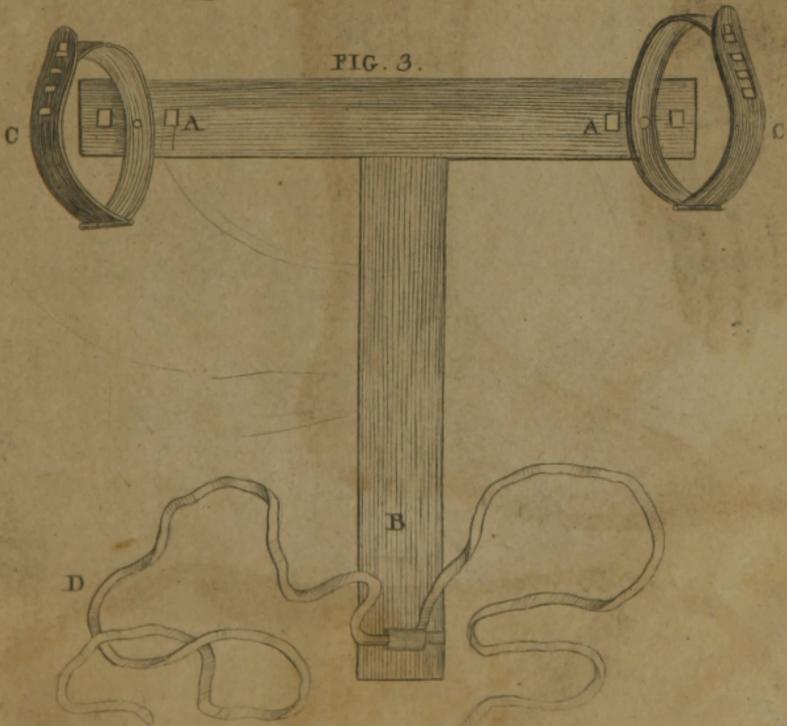




FIG.

1.



FIG. 2.

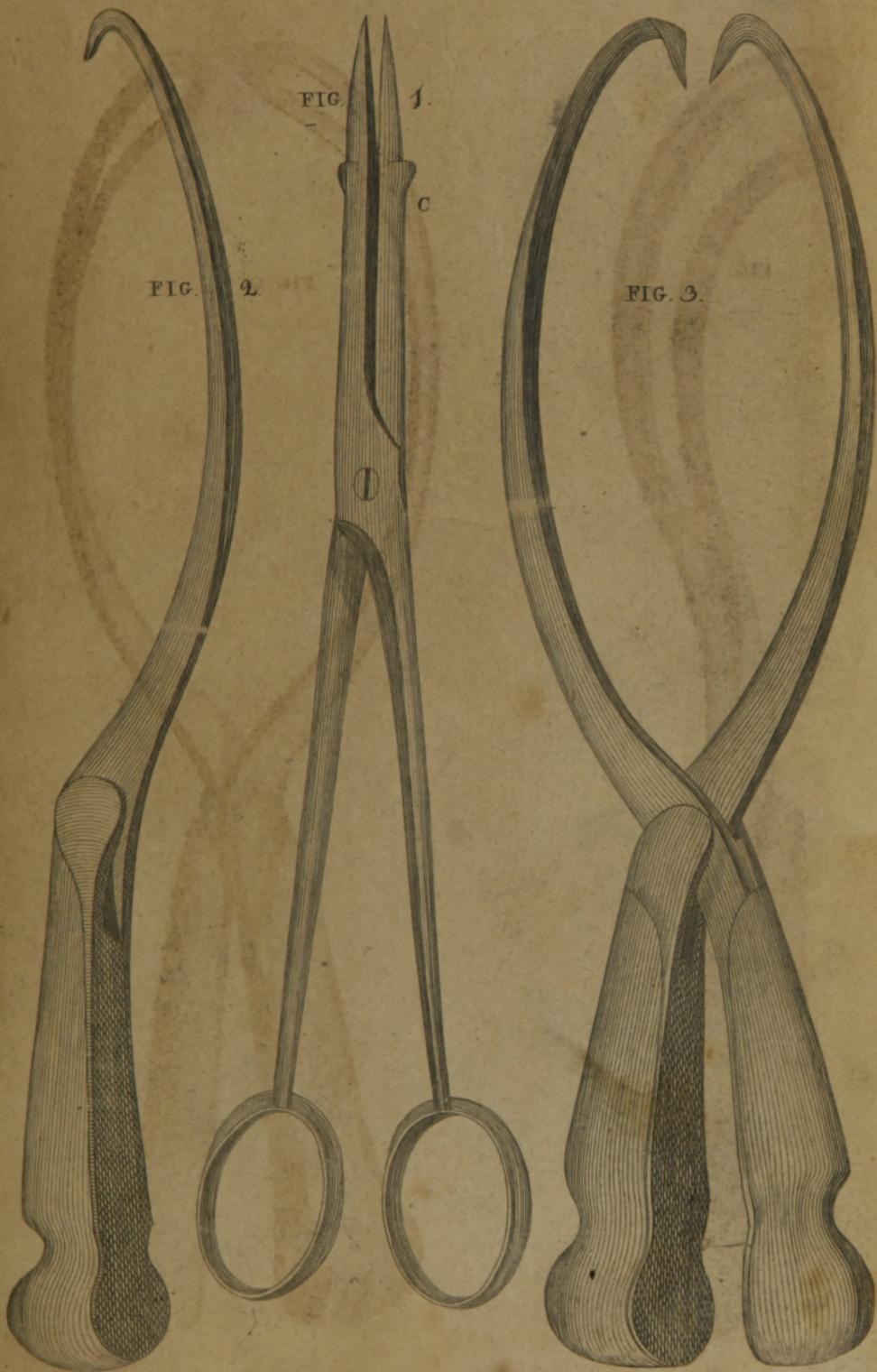




PLATE CIV



FIG. 1.

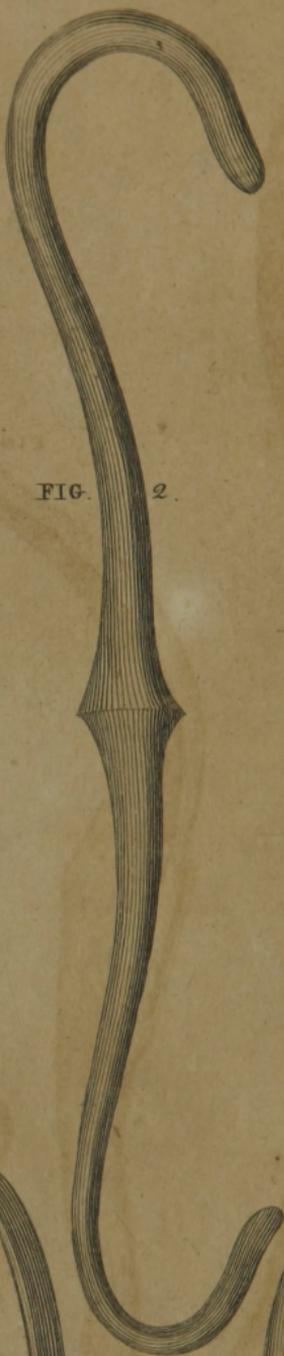


FIG. 2.



FIG. 3.



FIG.

1.

FIG.

2.



PLATE CVI



FIG. 1.



FIG. 2.

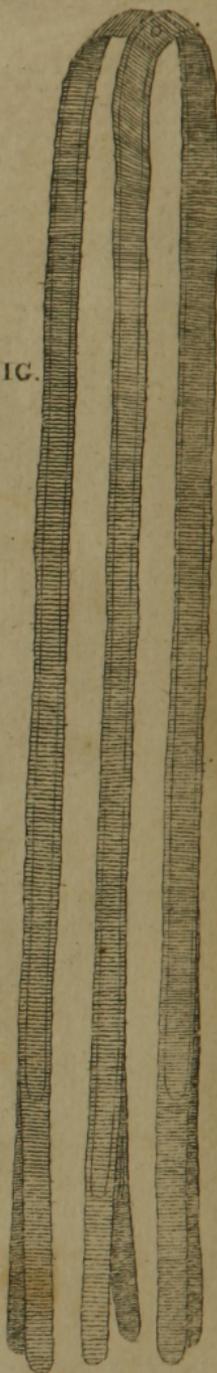


FIG. 3.

PLATE CVII

FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



FIG.

5.



FIG.

6.



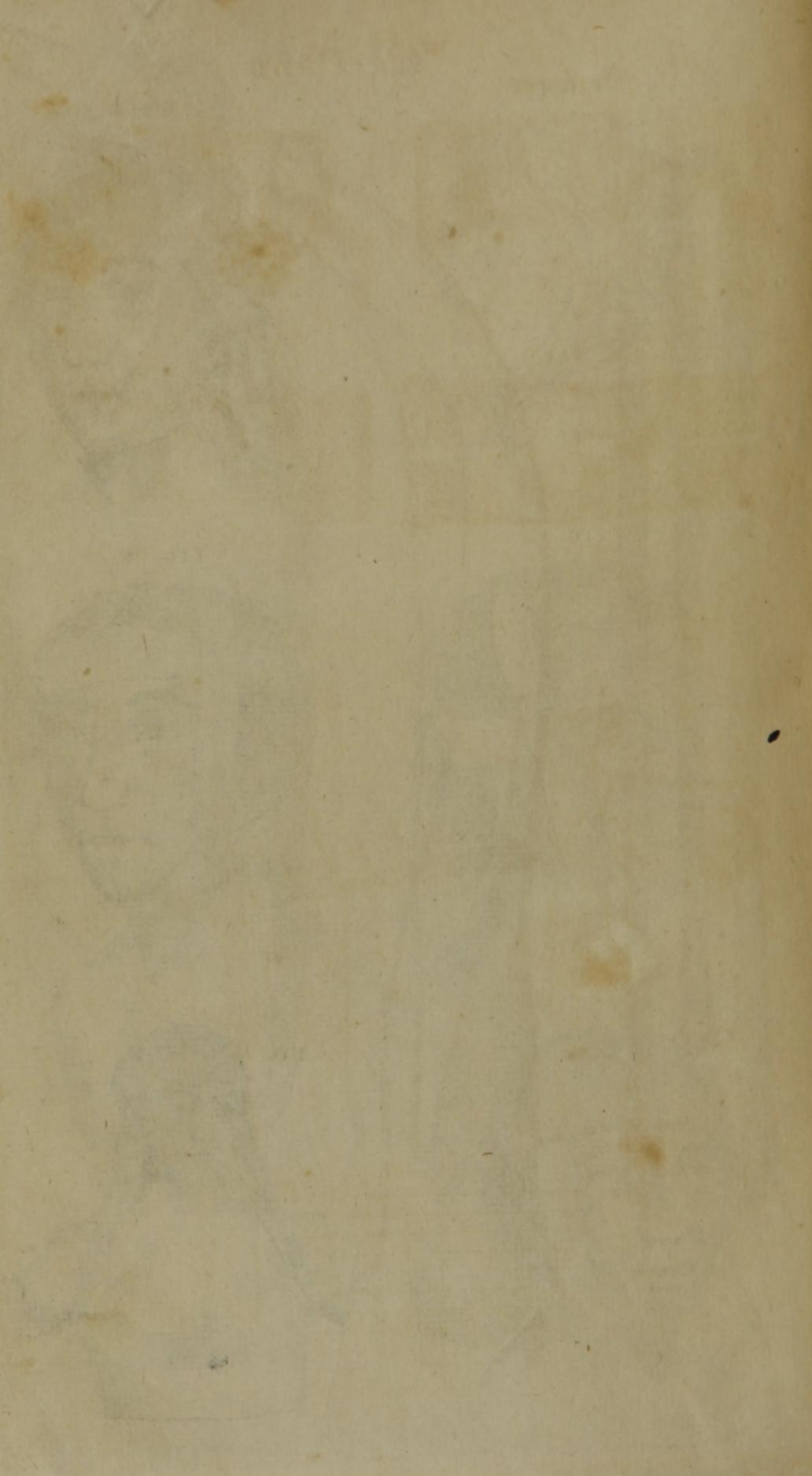


PLATE CVIII

FIG. 1.



FIG. 2.



FIG. 3.

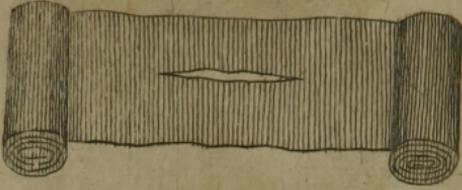


FIG. 4.

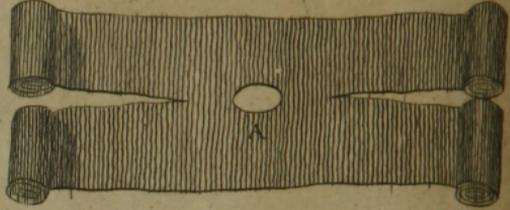


FIG.

5.

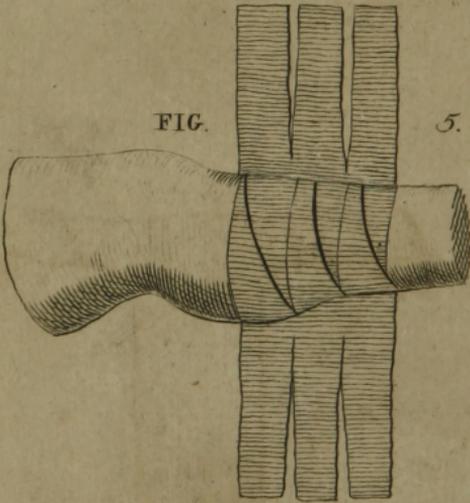


FIG.

6.

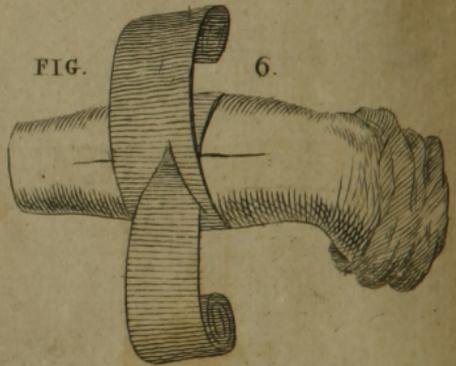


FIG. 7.

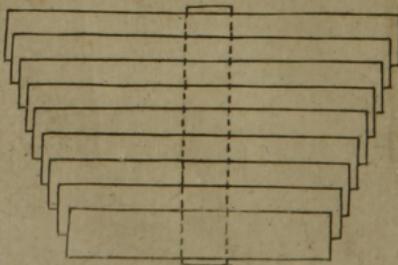


FIG. 1.

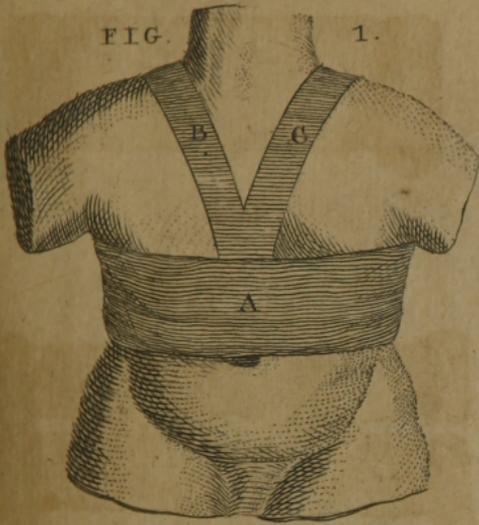


FIG. 2.

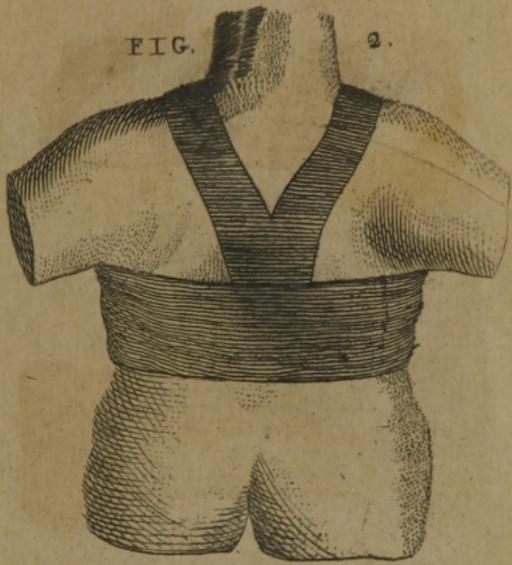


FIG. 3.

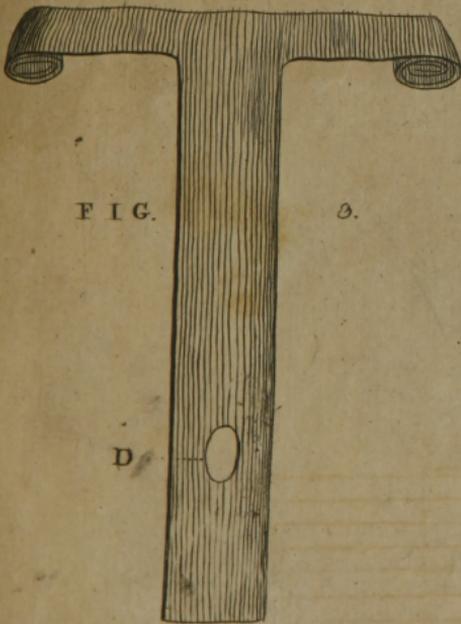


FIG. 4.

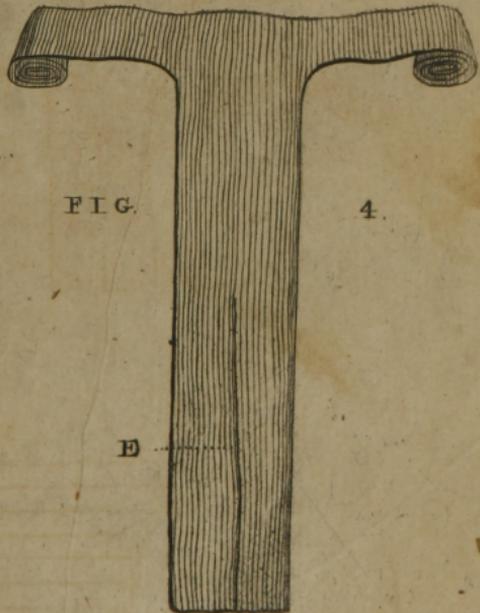


PLATE CX

FIG. 1.

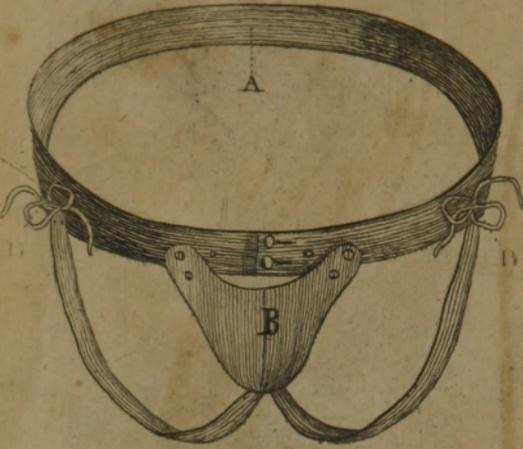


FIG. 2.

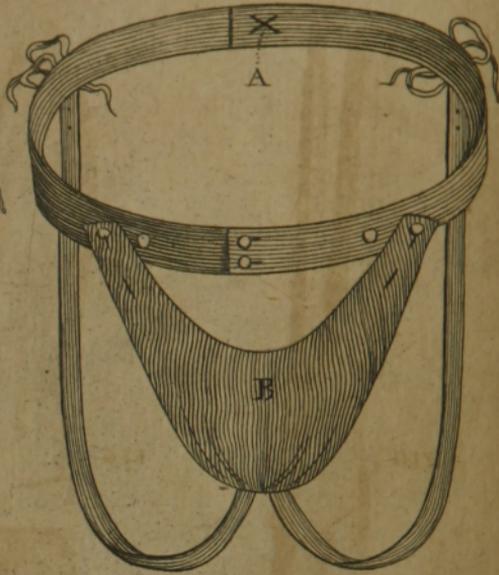


FIG. 3.

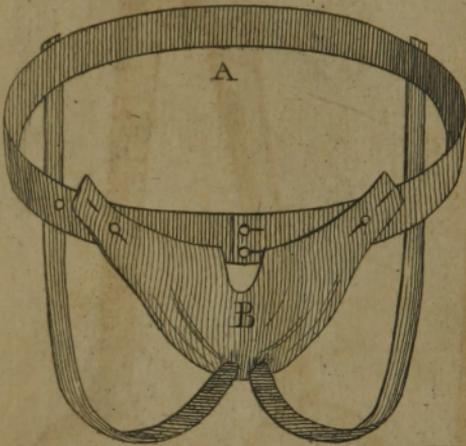


FIG. 4.

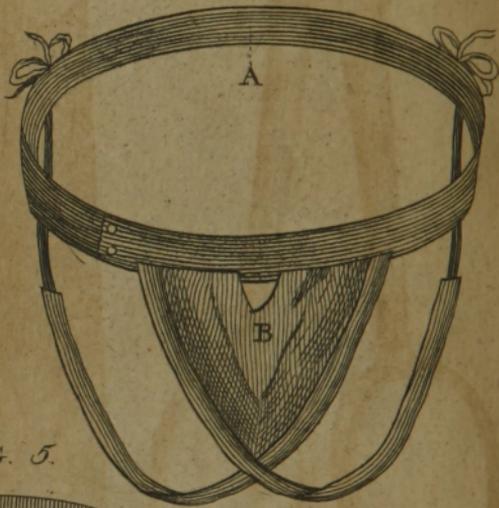


FIG. 5.

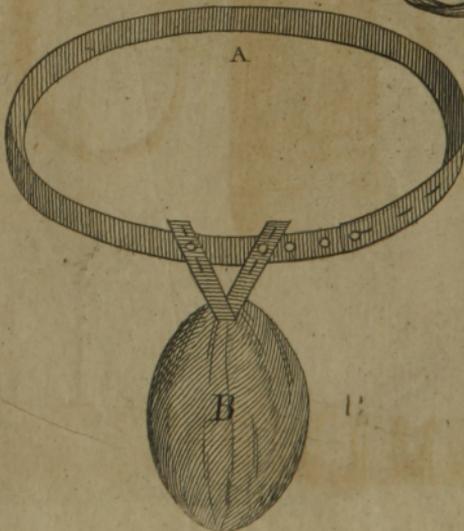


FIG.

1.

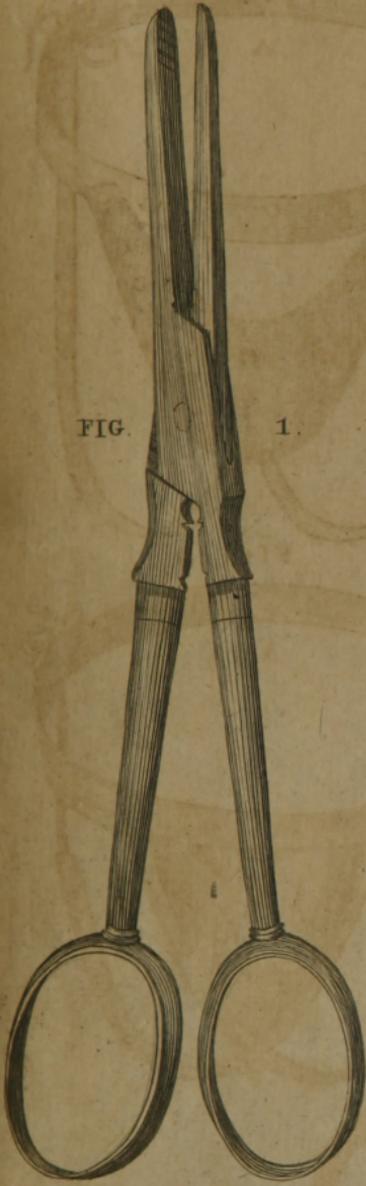


FIG.

2.



FIG.

3.



FIG. 4.





1.

FIG.



2.

FIG.



3.

FIG. 4.

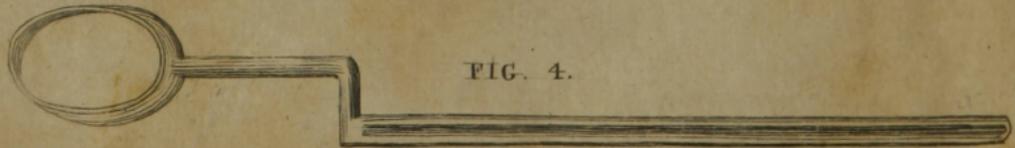




PLATE. CXIII

Fig

1



Fig

2



Fig

3



Fig 4

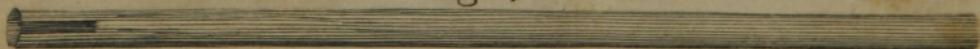


PLATE CXIV







PLATE CXV

Fig. 1



Fig. 2

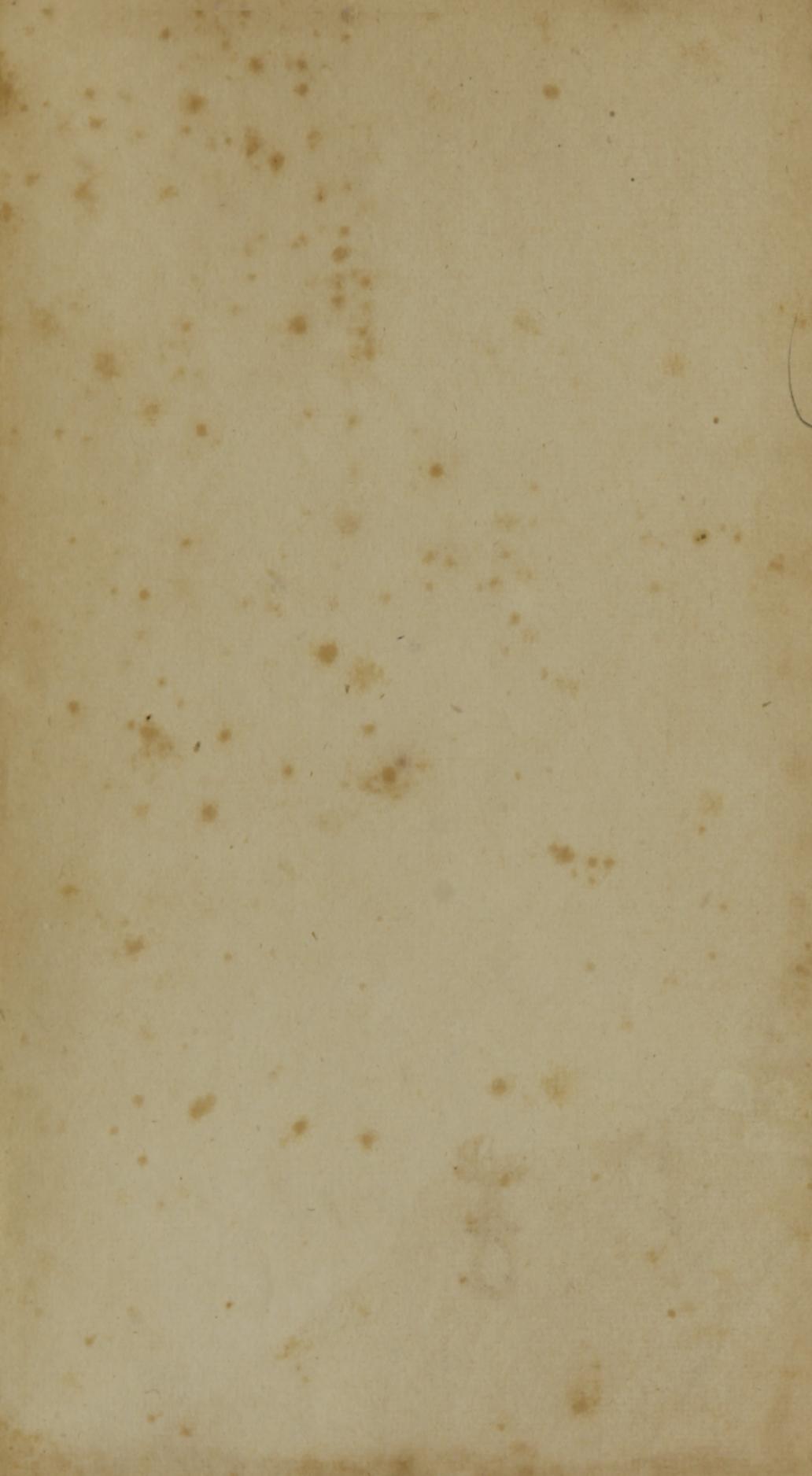


Fig. 3



Fig. 4





Robert Ham

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