

or a dilated follicle, will frequently catch the point of a fine instrument, while a blunt sound will escape the obstacle, and, presenting fairly at the bulbo-membranous junction, will presently pass, perhaps smoothly, perhaps with a little jump, as it rides out of the sinus of the bulb into the membranous urethra.

The stricture, once detected, may be located, calibrated, and measured with the blunt steel sound, with the bulbous bougie, or with the urethrometer. Obstructions beyond  $6\frac{1}{2}$  inches may be set down as due to prostatic enlargement, particularly in patients more than fifty-five years old. If the bulbous bougie or the urethrometer be used alone, there is danger of assuming that the point of physiological narrowing, at about the middle of the pendulous urethra, is a stricture requiring treatment by cutting when there is no real occasion for the operation. If this point is covered by granulations, however, and bleeds as the bulb passes it, it is in a diseased condition, and may require sounding, although no true stricture exists—only a granular condition due to prolonged chronic inflammation. These are among the so-called strictures of large calibre so popular at the present day, so common in occurrence, so rich a field for the young surgeon, and sometimes the occasion of unnecessary cutting, as it appears to me, since the gleet they occasion may be permanently removed by a few passages of a large sound without recourse to the knife, and in most instances, when the gleet has been cured by the sound, although the physiological narrowing continues, the patient becomes and remains well without the necessity for further use of instruments in his urethra.

Just within the meatus—at  $\frac{1}{8}$  to  $\frac{1}{4}$  inch—there is very often a point of congenital narrowing (meatus secundus) which may be cut if there is any occasion for using an instrument larger than it will admit—otherwise it may be disregarded. It is always wise to divide it if stricture exists beyond, because a free meatus greatly facilitates the use of large sounds (p. 170).

**Differential Diagnosis.**—So much for the method of examination. The presence of an obstruction having been determined, the differential diagnosis lies between organic stricture, spasm, and chronic inflammation. The position of the obstruction and the various points dwelt upon in the preceding paragraphs, and in the chapter on Spasm, are elements in the diagnosis. But the most distinguishing characteristic of all is resiliency. Organic stricture is always elastic and resilient, the others are not. To test this resiliency a sound—the largest that will pass—is gently introduced through the supposed stricture. It is allowed to rest in place for a moment, and then an attempt is made to withdraw it. *If there be*

*organic stricture the withdrawal of the instrument will be opposed by a firm grasping* as long as the instrument remains engaged in the stricture. If there be no grasping there is no organic stricture.

To tabulate these features briefly—

	Organic Stricture.	Spasm.	Urethritis.
Shreds or pus..	Always present.	Not present unless there is an inflammation. Only in membranous urethra. No.	Always present. Sometimes. No.
Obstruction....	“ “		
Grasping.....	“ “		

On the other hand, when the stricture is impassable and situated at the bulbo-membranous junction it may be impossible to distinguish it from spasm without the aid of general anesthesia. Yet in most cases the two may be differentiated by patient pressure with a blunt sound.

CHAPTER XII

STRICTURE OF THE URETHRA—INSTRUMENTS AND MANŒUVRES EMPLOYED IN TREATMENT

BEFORE passing to the treatment of stricture, it is better to describe at once the instruments used, the methods of manipulating them, and the operations in which they are employed, in order to avoid endless repetition.

Great mechanical ingenuity has been displayed in the construction of instruments for the detection and treatment of stricture. Such of them will be mentioned as are considered best suited for these objects. Space will not allow a description of more than the type instruments of each class.

The instruments which it is necessary for the surgeon to possess in order to meet the requirements of all cases of stricture are: different varieties of bougies, sounds or dilators, and catheters with a scale; instruments for internal and external urethrotomy, and an aspirator.

BOUGIES

**Filiform Bougies.**—Filiform or hair-like bougies are such as measure 1 mm. or less in diameter—size No. 3 (1 mm. diameter) being the smallest size that can be accurately measured on a scale-plate. There are three varieties of filiform bougies: the French, the English, and the whalebone. They are all made conical, narrowing down to a fine point, and gradually increasing for an inch or two until the full size of the shaft is reached. The whalebones are olive-tipped.

Woven French filiforms are used as guides to certain urethrotomes (Maisonneuve), being joined to them by metallic screw ends (Fig. 39). They are also employed at Necker as guides for sounds. The Maisonneuve urethrotome, or any other, can be guided into the bladder as well upon a whalebone guide as following a soft one. I have not found that sounds needed any guide. The English filiform instruments have no especial value; they are a little stiffer than the French, but not so good as the whalebone.

Whalebone filiform bougies are thin, hair-like strips of whalebone, very smooth and conical, with slightly bulbous points. By dipping them into hot water the ends may be variously shaped (an expedient employed in difficult catheterism since the last century)—twisted into spiral, bent into zigzag (Fig. 40), a modification which is of vast assistance in threading tortuous strictures and escaping false routes and lacuna. The instrument may be rotated during its passage, and its point thus presented at different parts of the circumference of the canal, so as finally to engage in the orifice of the stricture. These bougies, about 2 feet long, are also used as guides for larger instruments, not by being screwed upon them, but by being threaded through a metallic loop made for the purpose upon the under side of the instrument which they are to guide—an adaptation of Desault's principle. Such instruments are called tunnelled (Fig. 46). Prof. William H. Van Buren<sup>1</sup> originated this device. These guides render splendid service as conductors, but three cautions are necessary:

1. The guide should be 18 inches long. No cracked, bent, fissured, or frayed-out instrument should ever be used.

2. In employing a whalebone as a guide, it should first be introduced into the bladder, then threaded into the instrument to be guided, and the latter pushed gently down to the strictured point, while the whalebone is held stationary at the meatus. If force be used here, the slender guide may double up and a false passage may be made; but this may always be avoided by gently and continuously retracting the guide as the conducted instrument is passing the dangerous point, and until it reaches the bladder. The length of the guide permits this to be done.

3. The loop of the instrument to be conducted should always be amply large, and be smoothed off in front so as to have a rounded and not a cutting edge; and, if the movement of extracting the guide, as the tunnelled instrument is being introduced, cannot be performed as above described, both instruments should be withdrawn; for, if the one be forced forward or the other pulled back, there is danger of cutting off a portion of the whalebone and leaving it in the canal—an accident which has occurred in very competent hands.

<sup>1</sup> Refer to note, p. 127, first edition of this treatise, Van Buren and Keyes.

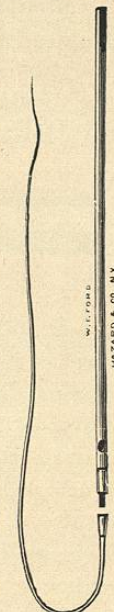


FIG. 39.

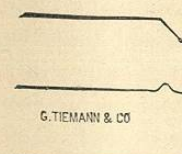


FIG. 40.

Large whalebone bougies, having several inches of filiform tip and then suddenly growing larger in the shaft, have been devised by E. A. Banks, of New York. They are equivalent to a filiform bougie and a tunnelled sound (Fig. 41).

**Manipulation.**—Regarding the method of introducing filiform bougies, a few words will suffice. Their fine points are likely to catch, chiefly in the lacuna magna, but also in any of the numerous sinuses of Morgagni, in any false passage, or against membranous

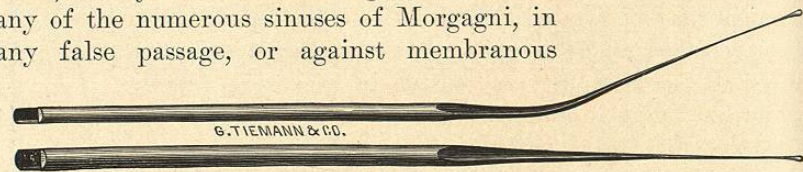


FIG. 41.

bands and folds of the urethra, in the tortuous turnings of a stricture, or in the softened, reticulated membrane behind it. With the whalebone bougie—perhaps with any filiform instrument—these obstacles may generally be surmounted. There are two special manœuvres for accomplishing this:

1. When an instrument catches, partially withdraw and slightly rotate it, pushing it forward while making the rotatory movement. This device rarely fails in finally engaging the instrument in the orifice of the stricture, especially if the filiform point be bent or twisted in any direction (spiral or zigzag), so that its extremity may lie outside of the axis of the shaft of the instrument.

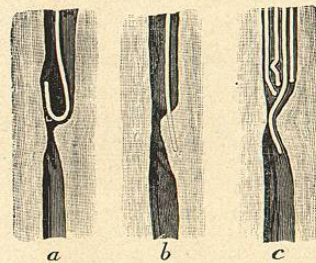


FIG. 42.—THE INTRODUCTION OF WHALEBONE GUIDES (Bryant).

a, guide bent upward; b, guide in lacuna; c, numerous guides in urethra, one passing stricture.

2. An excellent method of finding the orifice of a stricture, especially where false passage exists, consists in cramming the urethra full of filiform bougies, engaging their points in all the lacunæ and false passages, and then trying them, one after another, until that one is pushed forward which is presenting at the orifice of the stricture, when it will at once engage (Fig. 42).

The use of filiform bougies in threading tight strictures is greatly facilitated by first injecting the urethra with warm oil. Filiform bougies, intelligently used, make impassable strictures the greatest rarities in a surgeon's practice.

**Woven Bougies.**—Of other bougies (not filiform) only the French and English conical need be described—the blunt are not use-

ful. Bougies are woven instruments covered with gum or varnish. They come of all sizes, and are necessary in the treatment of stricture up to size 15 or 20 (French). The olive-tip is of advantage in

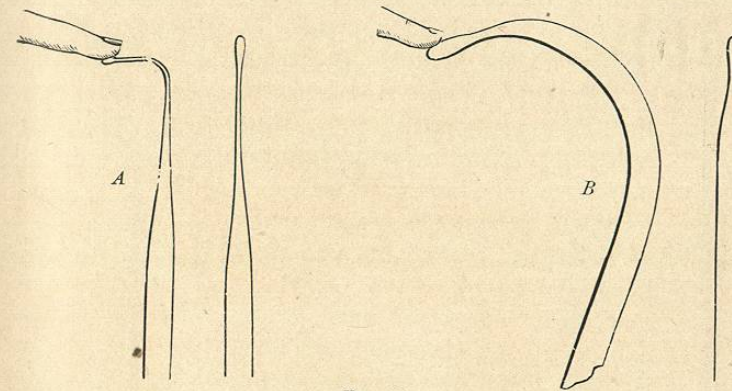


FIG. 43.

the large sizes, objectionable in the small. When choosing olive-tipped bougies, preference should be given to such instruments as are rather stiff, but have a long, slender, flexible neck supporting the bulb. When held vertically, bulb uppermost, and touched upon the olivary tip, the neck should yield at once (Fig. 43, A). Such an instrument will guide itself safely and override obstructions. The English olivary bougies lack this quality (Fig. 43, B).

Of late years the French have far surpassed the English in the manufacture of woven instruments, and I know of no American instruments that equal the French in durability, flexibility, and polish. The best French bougies may be boiled without injury.

**Bulbous Bougies.**—The bulbous bougies (*bougies-à-boule*) are useful instruments for the accurate diagnosis of stricture. They are either woven or metallic. They consist of a flexible, woven shaft headed by an acorn extremity of a diameter much greater than that of the shaft, and are sized according to the diameter of the head. A set of them, running from 5 to 30, is required. Anything too tight for 5 (5 mm. in circumference) may be said, practically, only to admit a filiform instrument (size 3). A bulbous bougie should have a short conical head and an abrupt shoulder (Fig. 44). Instrument makers have them of all varieties, with very pointed, even oval heads and no shoulders—occasionally with two or three bulbs. These are not useful. The metallic silver bougies are more durable and more easily sterilized than the woven, but, being stiff, they are more irritating and less accurate.



FIG. 44.

**The Urethrometer.**—The urethrometer (Otis's) is a very ingenious little instrument, which is designed to take the place of a whole set of bulbous bougies, from size 20 to 40 (Fig. 45). By

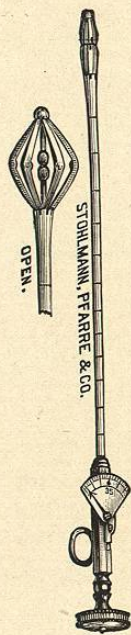


Fig. 45.

turning the handle the bulb is expanded to a size indicated upon the register at the handle. A rubber cap prevents its bars from scratching the mucous membrane. It is especially useful in calibrating the pendulous urethra. It is to be introduced beyond the deepest point of stricture, screwed up, and then drawn forward. The shaft is marked in inches and half inches, and, as it is drawn out, the location and size of the various narrow points of the urethra may be read off and located at once. The objection to the instrument is that it is more irritating than ordinary bulbous bougies, while the findings of these simpler instruments will satisfy the most fastidious. Other urethrographs and urethrometers are objectionable

for the same reason—viz., that they encourage a fanciful accuracy at the patient's expense.

**CATHETERS**

**Silver Catheters.**—Silver catheters do not wear out, and it is well to have a case of them on hand, of short curve, from size 9 to 22 French. They should be made blunt, not conical. No one not accustomed to manage difficult cases can safely use a silver catheter of a less size than No. 9 without a guide. Fine silver catheters may be used with safety and advantage only when guided—that is, with a soft filiform guide screwed upon the tip, as in the instrument of Bumstead, or tunnelled for a whalebone guide, after the manner of ordinary tunnelled instruments (Fig. 46).

**Soft Catheters.**—Three varieties of French flexible catheters may be mentioned: the flexible olivary, particular attention being

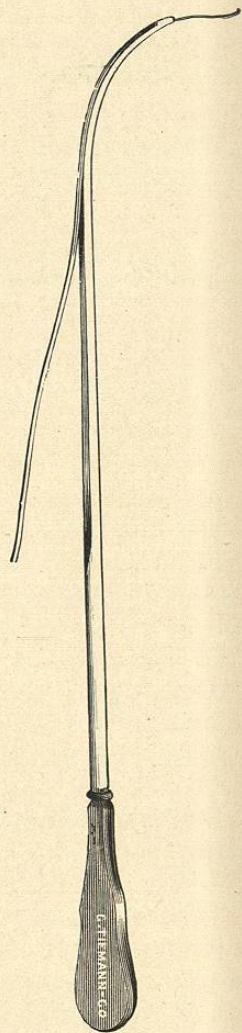


Fig. 46.—TUNNELLED SOUND.

given, in choosing the instrument, to the flexibility of the neck (Fig. 43, A); the flexible catheter, open at both ends; and a flexible instrument armed with a metallic tip, to be screwed upon a filiform guide. Only the first variety is in general use. In ordinary cases all soft catheters should be introduced without a stylet.

Soft-rubber (Nélaton) and elbowed woven catheters belong rather to the prostatic armamentarium, where they are described, together with the woven and metal catheters employed in cases of hypertrophied prostate.

**SOUNDS**

The most essential instrument for the treatment of stricture is the steel sound. It is the best instrument with which to obtain a cure, the only instrument to maintain one.

The sound should be made of the best steel and nickel-plated. Its proper curve has been described (p. 6). Straight sounds are used in the anterior urethra. Steel sounds are blunt and conical.

**Blunt.**—Blunt sounds, used in diagnosing a stricture, have a spherical extremity and the same calibre throughout. A complete set of them runs from 10 to 30 French. Alternate sizes suffice, for strict accuracy is unessential.

**Conical.**—Conical sounds increase from 7 to 14 sizes in the first 2 or 3 inches of their length. For a number of years I have employed a *double taper sound* (Fig. 47). This instrument spares the meatus while it is discharging the deeper parts of the canal. A set of conical instruments runs from 13 to 35 French. Yet below 20 French I prefer the woven bougie, and it is scarcely ever necessary to use an instrument larger than 31, except for overstretching immediately after urethrotomy. The double taper is unnecessary below 24 French.

In employing conical instruments of steel it should be remembered that the surgeon has the advantage of using a wedge as well as

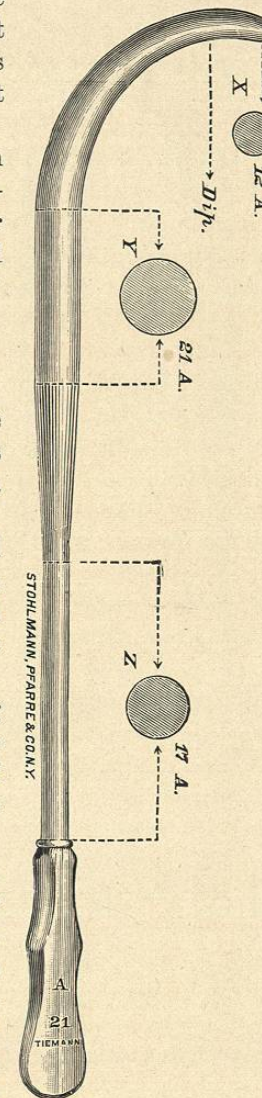


Fig. 47.—DOUBLE TAPER SOUND.

a lever, and, by carefully inserting any given conical steel instrument through a stricture, he practically does (with less violence) the same thing as if he passed a number of blunt instruments, since the conicity of the sound runs through many sizes.

**Advantages of Steel Instruments for dilating Stricture.**

—Since Thompson, one of the most brilliant minds connected with the subject of genito-urinary surgery, decided at one time in favour of the use of soft instruments for dilating stricture, a word will be necessary to state the reasons why the authors of this treatise hold a contrary opinion. In regard to facility of manipulation, that depends upon practice, and he will use this, that, or the other instrument the best who has used it the most. Less harm can be done with flexible than with solid instruments, undoubtedly, and on this account they are to be recommended for the unskilled, and for all, however expert, in the low sizes—below No. 15 French. In trained hands, however, the steel sound is perfectly safe; it is smoother than any soft instrument, and certainly can be passed into the urethra with less pain than any other instrument, and is capable of effecting more dilatation, in the same length of time, with the employment of less force. Steel instruments, made with the curve and conicity already described, possess all the powers of the wedge, and of a lever of the first order. The surgeon holds the long arm, the fulcrum is a sliding one, situated at the junction of the shaft with the curve, perhaps steadied by the surgeon's finger. The immense power which the application of this compound mechanical principle, in the construction of the instrument, gives to it, is not appreciated by surgeons.

The ease with which harm may be done, in using force with conical sounds, is rarely realized until after an accident has occurred, and then the surgeon often ascribes the mischief to chance rather than to his own carelessness. Swelled testicle, congestion of the neck of the bladder, irritation of the stricture, even false passage, may be produced by a surgeon in too great a hurry, or using force. It is a rule, from which no departure should be made, either on account of solicitation by the patient, or of desire to push the case to a rapid termination, *never to use force with any instrument in the urethra—especially with conical steel sounds.* The character of the stricture may, occasionally, in the judgment of the operator, sometimes require force, but the motive for its use must never be haste, or desire to effect a rapid cure. The weight of the instrument, aided by a little coaxing, will usually exert all the power necessary. "*Festina lente*" is the golden rule. Patience and gentleness will effect more in the long run than force.

The method of preparing and introducing a sound has already been described (p. 26).

**DILATORS**

From time to time various instruments termed dilators have been devised for the purpose of replacing a set of sounds by a single instrument. Thompson's dilator (Fig. 48) and Kollmann's dilators are the best known. The former is a dangerous instrument, and should never be employed except to remove foreign bodies from the urethra (p. 40). Kollmann's instruments (Figs. 49, 50) have, however, the advantage of an irrigation attachment, by means of which the urethra may be thoroughly washed out while distended. Great virtues are attributed to the

instrument on this account. Moreover, with it the urethra may be stretched to any size, regardless of the calibre of the meatus. This is a distinct advantage in that it may spare the patient a meatotomy. But, on the other hand, the dilator is not and cannot be a smooth instrument, and it is even more likely to be used roughly than the steel sound. These two facts overbalance its virtues and lead me to reject it.

The operation of *divulsion*, as practised with these instruments, is never warranted.

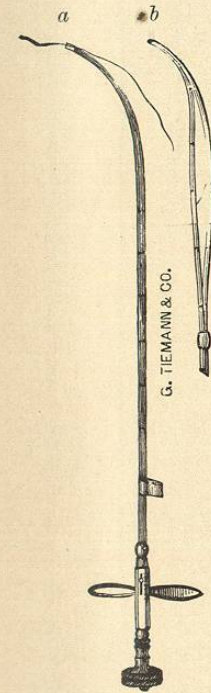


FIG. 48.

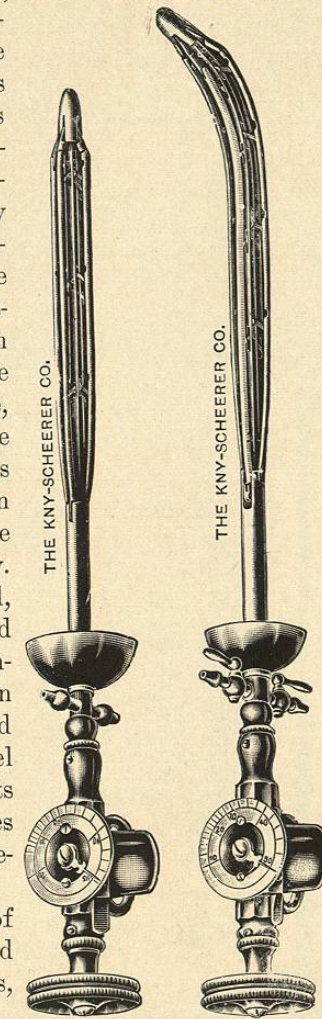


FIG. 49.

FIG. 50.

**URETHROTOMES**

Only four cutting instruments, suitable for dividing strictures in different portions of the urethra, need be described.

**Bistoury.**—The straight, blunt-pointed bistoury is the best instrument for dividing strictures at and quite near the external

meatus. These should always be cut upon the floor of the urethra to an extent sufficient to cut through *all* the morbid fibrous thickening which constitutes the stricture. (See Meatotomy.)

**Civiale's Urethrotome.**—This instrument (Fig. 51), of which there are many modifications, is used almost exclusively by Thompson and others for cutting permeable strictures of the anterior urethra.

It has a small, straight shaft terminated by a flattened bulb which conceals a rounded blade. By means of a mechanism in the handle this blade may be protruded to an extent indicated upon a register in the handle. The bulb is to be passed through a given stricture, withdrawn until it encounters the stricture, when the blade is to be protruded, and the stricture is cut by withdrawing the instrument. It is a very safe urethrotome. It is most serviceable for cutting a single linear, well-defined stricture of the pendulous urethra.



FIG. 51.

It is used with a screw-tipped filiform bougie. Bumstead has advantageously modified the original instrument by making the knife run only to the beginning

<sup>1</sup> This is the practice of most continental surgeons, but in this country external urethrotomy is preferred for these cases.

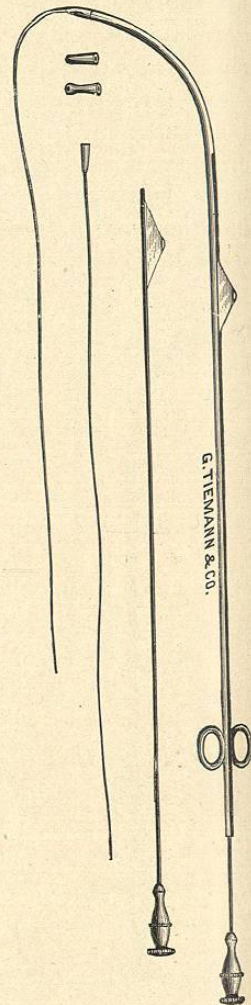


FIG. 52.—BUMSTEAD'S MAISONNEUVE URETHROTOME.

of the curve, instead of up to the point, and by making the tube a little more solid. Bumstead's instrument has the blade on the lower side, and therefore is not appropriate for strictures of the pendulous urethra, since these should always be cut on the roof. Other varieties of the Maisonneuve instrument do this.

The instrument is introduced, following its guide, and depressed until the straight portion of the tube has passed the stricture. Then the blade is entered, pushed rapidly down as far as it will go, and immediately retracted. The objection to the instrument is that it incises the urethra blindly and throughout its length if a large blade is used, while it may fail to divide the whole thickness of the stricture if a smaller blade is selected. Another objection—that the soft woven filiform is liable to curl up in front of the stricture instead of engaging—is overcome by the use of a stiff woven filiform or of a whalebone bougie threaded as for the tunnelled sound.

**Otis's Dilating Urethrotome.**—This powerful instrument (Fig. 53) is a very valuable one for cutting strictures in the pendulous urethra. It has a straight, oval shaft, about size 20 (a smaller and correspondingly lighter instrument is made, but the stiffer one is the better). The end of the shaft is tunnelled for the passage of a whalebone guide. The two segments of the shaft are separated by turning the screw in the handle, the extent of separation being registered upon a plate on the handle. The limit of this separation is 45 French. The knife is narrow, concealed in the shaft at a point near the end of the instrument. It is disclosed by withdrawal, when it rides upon a ridge which is continuous up to the handle. The instrument is introduced until the point of emergence of the knife is about  $\frac{1}{2}$  inch behind the deepest stricture to be cut. The blades are then separated until the stricture is well upon the stretch. The knife is withdrawn, cutting the tense tissues. The instrument may then be still further screwed up if desired, and the cutting continued to any extent upon the roof of the urethra. The whole roof or a part of it may be cut. The knife is then returned, the instrument unscrewed and withdrawn.

**The Choice of Instruments.**—The Otis urethrotome is the instrument generally used in this country, and the preference is justified

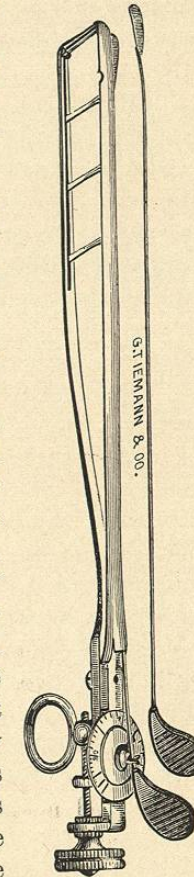


FIG. 53.