

New Inventions.

A BACK-FLOW CATHETER FOR URETHRAL IRRIGATION.

OPINIONS differ very much concerning the treatment of gonorrhœa by the use of antiseptic and astringent injections, but the majority of those who see much of the disease order injections of some kind to be used during one stage or another. There can be no doubt that if an injection is to do any good at all it must be properly administered, and much of the failure of injections to hasten the cure must be attributed to the inadequate method



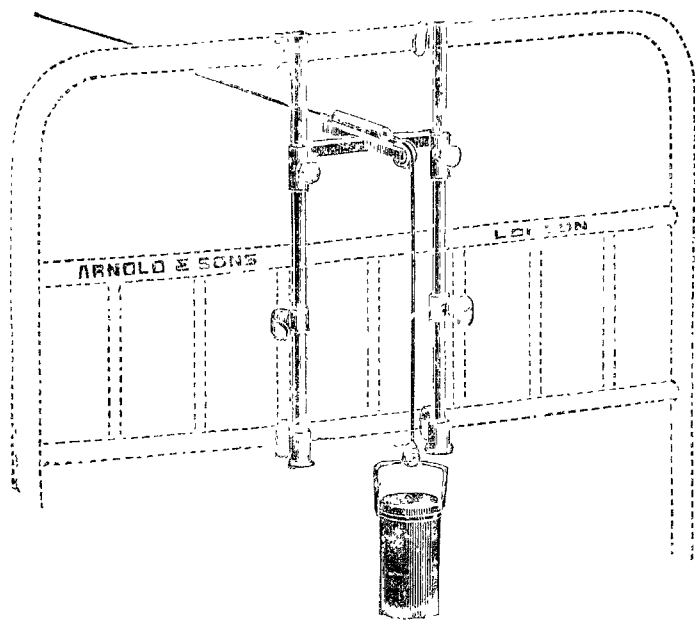
of use. Messrs. Down Brothers of 21, St. Thomas's-street, London, S.E., have made for me a back-flow catheter through which any quantity of fluid can be made to irrigate the whole urethra without entering the bladder. The instrument is composed of a metal catheter, with a bulbous extremity, curved in the ordinary way. The eyes of the catheter consist of three apertures situated at the junction of the stem and the bulb. The greatest diameter of the bulb is three sizes larger than that of the stem. I have found that No. 4 for the stem and No. 7 for the bulb is the most useful size. The shoulder of the bulb fills up the urethra in front of the eyes and all the lotion escapes in a rapid stream at the side of the stem. The best arrangement is to attach the instrument by means of a rubber tube to a can containing one quart of the lotion. The instrument is passed with the ordinary precautions as far as the compressor urethræ, when it is naturally arrested. This is far enough for a case of anterior urethritis, but in posterior urethritis the instrument should be passed into the bladder, and then withdrawn until the bulb is felt to be just grasped by the vesical orifice. The douche can is raised three feet above the patient's bladder and the quart of lotion takes from three to five minutes to run out. An intelligent patient can be taught to do this for

himself night and morning, and provided he sterilises the catheter each time there is no more risk of septic infection than when he uses an injection with an ordinary glass syringe. The rapid improvement in cases where it is used will soon convince anyone of the practical utility of the device. An ordinary glass syringe can, of course, be used instead of the douche can.

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THE NORLEDGE EXTENSION APPARATUS.

THE illustration represents an extension apparatus for surgical purposes which seems to me to possess advantages over those at present in use. Some of its special features are that it is free from vibration, simple in construction, easily fixed, portable, slightly, and can be rendered aseptic. The apparatus consists of a frame having adjustable hooks by which it can be hooked on to the rails at the foot of the bedstead and to the frame is adjustably attached a tube through which runs a cord, having at one end means of attaching it to the leg of the patient and at the other end a weight or shot-can, a pulley being provided for the cord to pass over. A convenient form of the apparatus is two bars, each having a rigid hook at the upper end and an adjustable one at the lower end. On these bars slides a cross-bar, detainable in any required position and carrying a tube having a pulley at one end,



through which tube passes the cord. The makers are Messrs. Arnold and Sons, West Smithfield, London, E.C.

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A NEW METAL CATHETER GAUGE.

I HAVE usually found that a considerable amount of vagueness exists, not only about the numbers and diameters of the French and English catheters respectively, but also on the relation the two scales of measurement bear to each other. To obviate this I have devised the following instrument, of which the accompanying figure is an illustration. By an omission the last three numbers of the diameter in millimetres of the French catheters have been left out in the figure. The gauge is made of German silver (polished) and is 13½ inches in length and 5 inches wide. On the left-hand side the number and diameter in millimetres of the French catheters are represented, and on the right side the English. By using this gauge not only can the number and diameter in millimetres of any metal catheter be determined at once (and this is a great advantage where the numbers are only placed on the stylets, which are liable to be put back into the wrong catheters) but also the relation the French scale bears to the English can be appreciated at a glance. The gauge can be sterilised by boiling and does not tarnish. It has been made at my suggestion by Messrs. Arnold and Sons, West Smithfield, London, E.C., who after several trials have successfully surmounted all the technical difficulties in connexion with its manufacture.

METAL CATHETER GAUGE			
ARNOLD & SONS LONDON			
FRENCH		ENGLISH	
NUMBER	DIAMETER IN MILLIMETRES	NUMBER	DIAMETER IN MILLIMETRES
1	— 1/8	1	— 1/2
2	— 1/4	2	— 2
3	— 1/2	3	— 2 1/2
4	— 3/4	4	— 3
5	— 1	5	— 3 1/2
6	— 1 1/4	6	— 4
7	— 1 1/2	7	— 4 1/2
8	— 1 3/4	8	— 5
9	— 2	9	— 5 1/2
10	— 2 1/4	10	— 6
11	— 2 1/2	11	— 6 1/2
12	— 2 3/4	12	— 7
13	— 3	13	— 7 1/2
14	— 3 1/4	14	— 8
15	— 3 1/2	15	— 8 1/2
16	— 3 3/4	16	— 9
17	— 4		
18	— 4 1/4		
19	— 4 1/2		
20	— 4 3/4		
21	— 5		
22	— 5 1/4		
23	— 5 1/2		
24	— 5 3/4		
25	— 6		
26	— 6 1/4		
27	— 6 1/2		
28	— 6 3/4		
29	— 7		
30	— 7 1/4		

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THE LANCET.

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The Meaning of Scientific Method.

IF the average citizen were asked to describe the method pursued in scientific investigation, he would probably answer somewhat to the effect that it consisted in the observation of phenomena and the record of what was observed—that the chemist mixes various substances in his test-tubes or heats them in his crucibles and retorts and observes what takes place; that the biologist collects his plants or animals and arranges them according to their resemblances in groups; that the astronomer studies the movements of the stars and notes their positions and relations on a map. The average citizen might add that the use of instruments of precision is necessary to such observation, but he would still probably regard mere record of particulars as the essence of science. In such an answer there would undoubtedly reside a large portion of truth, since accurate observation is the first requisite of every branch of knowledge and the majority of researchers must be content with such work alone, leaving to a chosen few the processes of inference and generalisation; but it would be a small portion only of the whole truth. Yet it may be doubted whether many among the large army of workers in the field of science would be prepared to supply off-hand an adequate account of the methods pursued in scientific advance. We reason intuitively and leave it to the logicians to analyse the processes of thought. Hence actual advances in knowledge have always preceded the formulation of new methods of scientific investigation. In days long ago the mathematical sciences were carried to a high pitch of perfection, and with this came ARISTOTLE'S masterly analysis of the deductive method of reasoning, to which little or nothing has been added in more recent times. The revival of the study of nature, which in the sixteenth century followed the overthrow of blind belief in traditional wisdom, was the forerunner of BACON'S "Novum Organum," or new instrument of scientific inquiry as analysed by him. This was the inductive method, which had been known indeed to ARISTOTLE but not invested by him with that importance which it was afterwards to attain. Yet, in truth, neither the inductive method by which we infer universal laws from a series of particular instances, nor the deductive method by which we descend from general rules to individual phenomena, is alone sufficient for our purpose when we investigate the secrets of nature. Both intellectual instruments must be used in combination, as was seen by MILL, whose work coincided with the rapid growth of scientific knowledge at the beginning of the nineteenth century, a growth which has continued uninterrupted to the present day. Very interesting examples of the mode in which great scientific discoveries have been made are given in a collection of

lectures¹ recently delivered at Oxford, which are now published by the Clarendon Press. One of the most notable instances is that of NEWTON'S discovery of the law of gravitation as set forth in his "Principia." The laws of motion as we know them were first discovered by inductive reasoning, and from them NEWTON deduced mathematically—that is to say, deductively—the truth that every body which moves in an elliptical orbit around another body lying in one of the foci of that ellipse is drawn towards the latter by a constant force. The planets are therefore drawn towards the sun by such a force. Starting from this result of deductive reasoning NEWTON advanced by a further induction to the universal law that all bodies are mutually attracted, in other words to the general law of gravitation. Both methods of logic were therefore necessary for this grand scientific generalisation.

The methods of reasoning adopted in the field of science do not differ in essence from those employed in forming judgments in the affairs of ordinary life; but the degree of accuracy demanded is higher, and for the purpose of attaining thereto constant verification of the conclusions arrived at is practised. The attitude of the scientific observer is one of scepticism on all points which seem to depend merely upon the dicta of authority. Accepted conclusions are constantly being discarded in the light of further knowledge, and closer and closer approximation to the truth thus constantly obtained. Only a short time ago nothing seemed more certainly established than the immutability of the chemical elements; now the old Heraclitean doctrine of continual change seems to be in process of revival and the mutability of the elements themselves is freely canvassed, if not yet generally accepted. If this constant change of doctrine is true of the physical sciences such as chemistry and astronomy, how much more may we expect to find it in the more complicated and therefore backward branches of knowledge dealing with life and with mankind? Here opinions must undergo a ceaseless, if often imperceptible, evolution. The once firmly established doctrines of Individualism and of Free Trade are now being subjected to a scrutiny as to their claims to constitute true generalisations, and the result of the examination is as yet obscure. Unfortunately, in the sphere of politics scientific methods are discarded; a system in which conclusions are reached by counting heads of partisans on either side is not conducive to a rapid process of ascertainment of truth. Yet even to political questions the logical methods to which we have previously alluded are ultimately applied, and the advance of knowledge is only checked, not arrested, by the idols of the market-place to which any particular generation bows the knee. That even temporary obscuration of truth is possible in these matters is due to the complexity of the problems presented by social inquiries, from which it results that accuracy such as is attainable in the more abstract sciences is here impossible.

But this complexity is not confined to social questions, it is present to an almost overwhelming degree even in the comparatively simple problems of physiology; it is still more perplexing in connexion with the

¹ Lectures on the Method of Science. Edited by T. B. Strong, Dean of Christ Church. Oxford, at the Clarendon Press. 1906. Pp. 249. Price 7s. 6d. net.