

1,303,135.

Patented May 6, 1919.
2 SHEETS—SHEET 1.

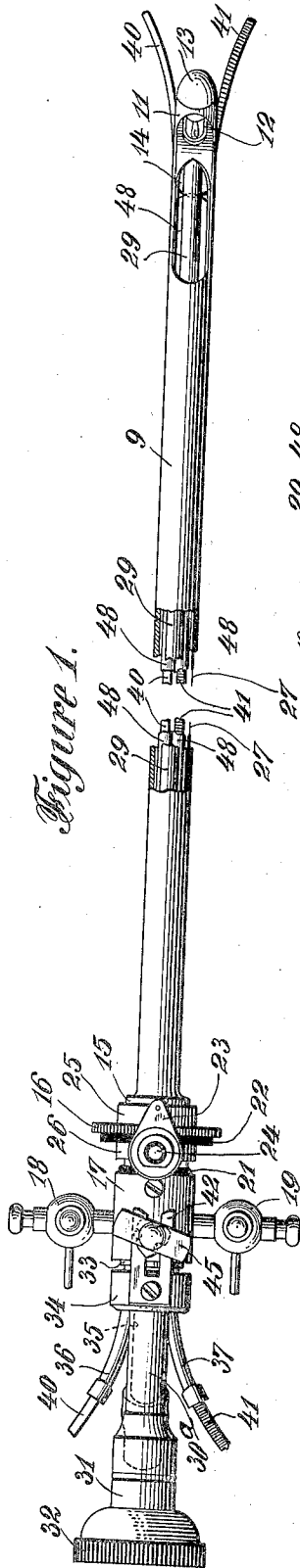


Figure 1.

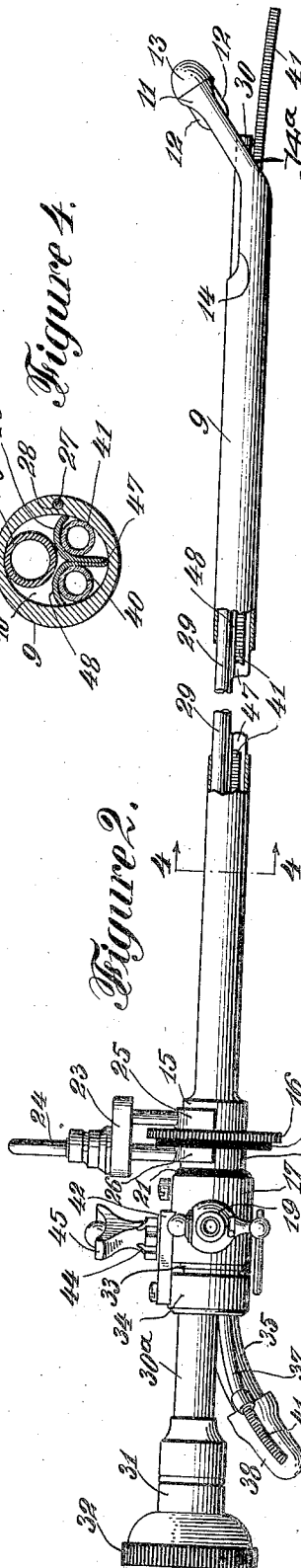


Figure 2.

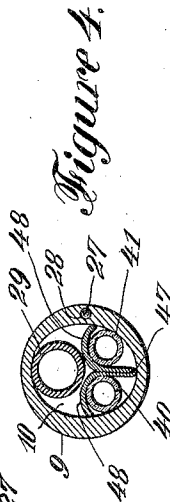


Figure 4.

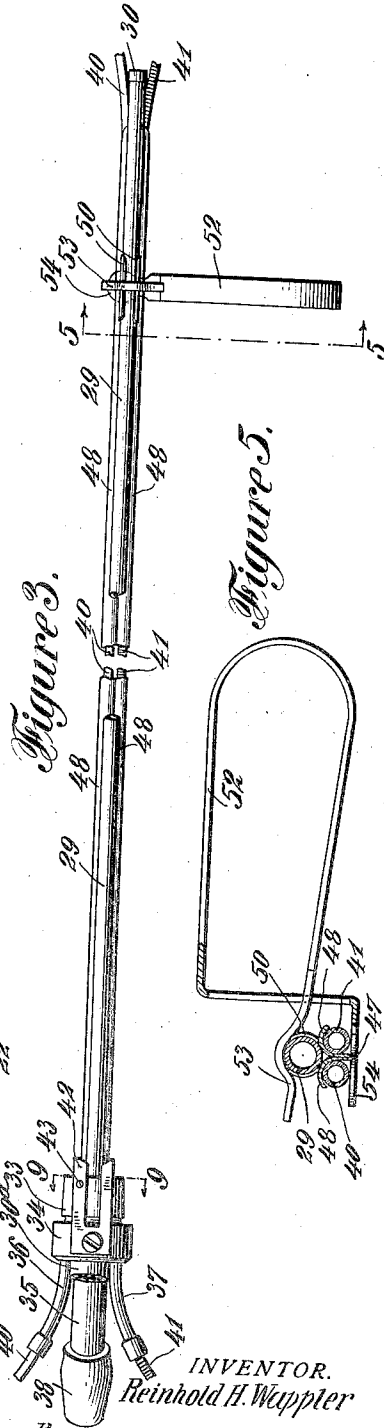


Figure 3.

Figure 5.

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SURGICAL INSTRUMENT.
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2 SHEETS—SHEET 2.

Figure 6.



Figure 7.

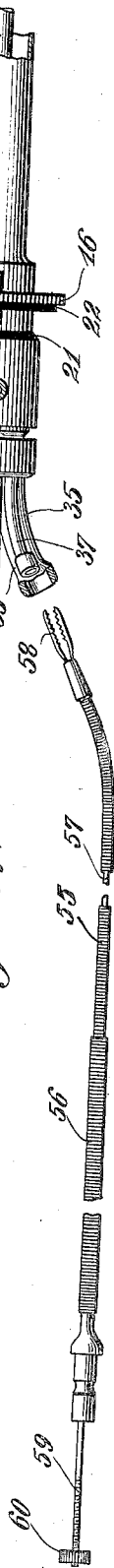


Figure 8.

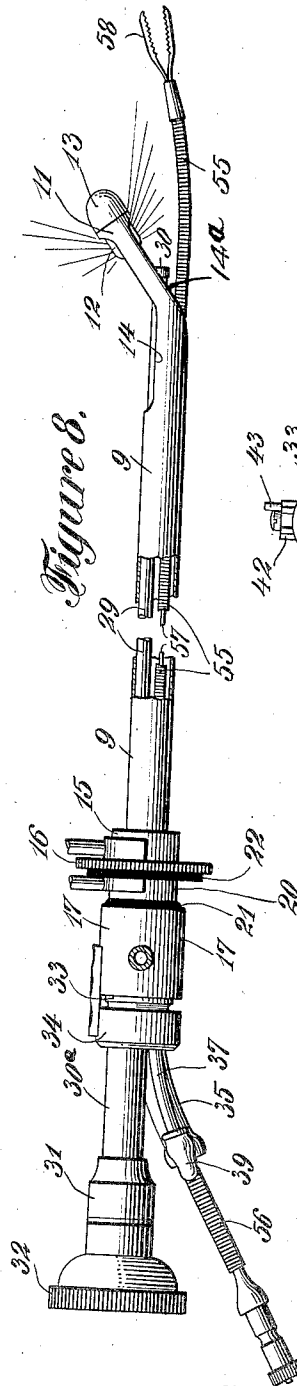
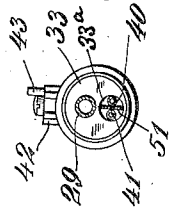


Figure 9.



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UNITED STATES PATENT OFFICE.

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SURGICAL INSTRUMENT.

1,303,135.

Specification of Letters Patent.

Patented May 6, 1919.

Application filed October 17, 1917. Serial No. 196,995.

To all whom it may concern:

Be it known that I, REINHOLD H. WAPPLER, a citizen of the United States, residing in the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Surgical Instruments, of which the following is a full, clear, and exact description.

My invention relates to surgical instruments of the kind associated with explorations of internal portions of the body, and performance of operations upon such portions while the same are subject to the actual view of the operator.

More particularly stated, I seek to provide a surgical instrument in which are effectively combined a cystoscope or its equivalent for enabling the operator to view directly various internal portions of the body, for instance the bladder, and guiding mechanism to be connected to the cystoscope, and adapted for use while the cystoscope is in action, for facilitating the introduction of exploring devices, and operating instruments, so as to enable the operator to employ the same, and also to observe every stage of his work.

While my invention is adapted for general use upon various internal portions of the body, it is of special service in connection with diseases of the bladder and other urinary organs.

In the surgical treatment of such diseases, there are in general three distinct steps to be performed. First, the bladder and parts adjacent to it must be inspected, by means of a cystoscope or its equivalent. Second, one or more catheters must be inserted and actuated after insertion, in order to enable the operator, by aid of the cystoscope, to locate the precise seat of the disease or obstruction sought, and also in some instances to facilitate the discharge of urine from the bladder. Third, an operating instrument, of a character dependent upon conditions, must in some instances be inserted and used in accordance with the surgical work found necessary.

Heretofore separate instruments have customarily been used for performing the three steps above enumerated. This has rendered the mechanism complicated and expensive, and has prevented the reduction to a minimum the length of time required for an operation.

By my invention I employ a single cysto-

scope for enabling the operator to make all necessary examinations and observations, the cystoscope being provided with mechanical means for holding and guiding, in succession and if need be while the cystoscope is in active use, first one or more catheters, and second an operating instrument of suitable form.

In other words I provide a cystoscope with means for enabling other instruments to be connected to it, these other instruments being interchangeable relatively to each other and thus employed.

Reference is made to the accompanying drawing forming a part of this specification, and in which like letters indicate like parts through all of the views.

Figure 1 is a fragmentary plan of my device, showing the cystoscope and parts accompanying the same as used with two flexible catheters.

Fig. 2 is a fragmentary side elevation of the mechanism shown in Fig. 1.

Fig. 3 is a fragmentary plan showing the cystoscope as carrying two catheters and a guide for the catheters, and also a clamp for holding these parts together.

Fig. 4 is a section on the line 4—4 of Fig. 2, looking in the direction indicated by the arrows.

Fig. 5 is a section on the line 5—5 of Fig. 3, looking in the direction indicated by the arrows.

Fig. 6 is a perspective of the guide, exhibited alone.

Fig. 7 is a side view of my device, partly in elevation and partly broken away, showing how the operating instrument is inserted and guided without interference with the cystoscope.

Fig. 8 is a fragmentary side elevation showing the device as used when the cystoscope and the operating instrument are in active use at the same instant.

Fig. 9 is a section on the line 9—9 of Fig. 3, looking in the direction indicated by the arrows.

A metallic sheath is shown at 9, and has a general tubular form, being provided with an axially disposed bore 10 having an elliptical cross-section, as shown more particularly in Fig. 4.

The sheath 9 is provided with an upturned end portion 11, carrying a tiny incandescent lamp 12. A cap 13, carried by the upturned

end portion of the sheath, is detachable in order to facilitate the removal and replacement of the lamp. This cap 13 also constitutes a tip for the end of the sheath, and for this purpose is rounded.

The sheath 9 is provided with a slot 14 merging laterally into the bore 10, and with an opening 14^a which is merely one extremity of the bore 10, as may be understood from Fig. 2.

The sheath 9 is further provided with an enlarged portion 15 and with a milled ring 16. The sheath is further provided with a short tubular portion 17, detachable from the main or body portion of the sheath, and carrying valves 18, 19 for discharging urine. The sheath is further provided with a collar 20, and with insulating members 21, 22 whereby this collar is insulated from other parts of the sheath.

Electrical connections are shown at 23, 24 and are provided with contact portions 25, 26, the latter engaging respectively the portions 15 and 20 of the sheath and being movable relatively thereto. The electrical connections may be turned bodily around on the axis of the sheath as a center, this purpose being facilitated if need be by use of the milled ring 16, which is fixed relatively to the sheath. An insulated conductor 27 is connected to the collar and therefrom extends through a small passage 28 to the incandescent lamp 12, for the purpose of causing the same to be illuminated.

The parts are so proportioned, shaped and arranged that when the sheath is empty its bore is totally free from any obstruction from end to end.

The barrel of the cystoscope is shown at 29 and carries a lens mounting 30, containing a spheroidal lens or other lens of the kind usually employed as the object lens of a cystoscope.

The barrel 29 is mounted upon a tubular stock 30^a, carrying a head 31 and milled rim 32, through which passes the axis of the cystoscope barrel, this axis being the line of sight of the operator as he looks through the cystoscope. The tubular stock 30 extends through a closure plug 33, as shown more particularly in Figs. 2 and 3, the axis of the stock not being exactly in the center of the plug, but a little eccentric thereto, so that when the closure plug is fitted into the tubular portion 17, the barrel of the cystoscope is in the upper portion of the sheath. This is indicated in Figs. 2, 4, 7 and 8.

The closure plug 33 is provided with a head 34 of substantially annular form, this head being eccentric to the axis of the stock 30 and therefore parallel to the optical axis of the cystoscope.

Extending from the head 34 is a middle tube 35 and two side tubes 36, 37. Each of these three tubes leads into a single passage

33^a (see Fig. 9) with which the closure plug 33 is provided. The passage 33^a is of cylindrical form, so located that when the closure plug is inserted into the tubular member 17, as indicated in Figs. 1, 2 and 8, the passage 33^a merges into the bore of the sheath, that is, into the lower portion of the bore when the sheath is in its normal position.

An obturator is shown at 38, and is simply a rubber cap for closing the outer or free end of the tube 35 when this tube is not in use. The obturator closes the tube water-tight and air-tight. Another obturator 39, similar in form but of smaller size, is used for closing either of the smaller tubes 36, 37.

Two catheters are shown at 40, 41. These catheters are each of tubular form and flexible. As here shown they are unlike in color so as to be readily distinguishable by sight. This is not essential and they may if desired be exactly alike.

For the purpose of holding the closure plug 33 in proper relation to the tubular member 17 I provide the head 34 with a form 42 carrying a pin 43, and upon the top of the tubular member 17 I mount a revolvable locking member 44, provided with a handle 45. The locking member 44 is actuated by the handle 45 for the purpose of gripping and releasing the pin 43. Thus the parts 42, 43, 44 and 45, together, constitute a clutch, for holding the closure plug 33 in a predetermined normal fixed position relatively to the sheath and parts carried thereby.

A guide 46, shown in its entirety in Fig. 6 and in this instance made of sheet metal, is adapted for attachment to the cystoscope barrel. A central rib 47 is provided with a pair of laterally extending wings 48, integral with it. The wings 48 are each curved in cross-section, as may be understood from Figs. 4 and 5. Preferably a single strip of sheet metal is bent back upon itself to form the rib, the edges of the strip being then bent outwardly from each other, and slightly curved, to form the wings. The rib is also provided with a notch 49, and with a clip 50 disposed adjacent this notch and soldered upon the upper surface of the wings. The clip has the form of a split cylinder, and may be sprung slightly so as to grip the barrel of the cystoscope.

The guide 46 also carries a fin 51, which is merely a thin blade extending from one end of the rib 47, as shown in Fig. 6. This fin is virtually a continuation of the rib 47, and is so formed and arranged as to extend into the passage 33^a whenever the guide 46 is mounted upon the cystoscope barrel as shown for instance in Figs. 1 and 3. The manner in which the passage 33^a is divided or cloven by the fin is shown more particularly in Fig. 9. The purpose of this ar-

5 rangement is to facilitate the insertion of the flexible catheters 40, 41 through the tubes 36, 37, and to direct each catheter into proper sliding engagement with the guide 46. The rounded surfaces of this guide, due to curvature of the wings 48 as shown in Fig. 4, still further facilitates the free movements of the catheters, as a semi-rounded passage is thus provided for each of the two catheters.

10 In practice it is sometimes convenient to attach the catheters to the guide 46 so as to facilitate the insertion of both the guide and the catheters, as practically a unit, into the sheath. For this purpose I employ a clamp 52, shown more particularly in Figs. 3 and 5. This clamp is made of spring sheet metal, and is provided with jaws 53, 54. The jaw 53 is fashioned to fit upon the barrel 29 and clip 50, the jaw 54 being of proper form to fit against the under side of the two catheters 40, 41 while the latter are in engagement with the guide 46. With the parts in this position the jaw 54 extends through the notch 49 and is thus prevented from slipping or moving along the guide 46.

15 With the parts thus arranged the operator can thrust the free end of the cystoscope barrel and the adjacent ends of the guide 46 and those of the two catheters into the sheath 9, and then by removing the clamp 52 he can push the cystoscope barrel, accompanied by the guide and catheters, until they protrude from the distant end of the sheath, as indicated in Figs. 1 and 2. Thus the closure plug 33 is brought to fit into the tubular member 17 and thus locked by means of the clutch, as above described.

20 In order to remove the catheters and guide, the operator withdraws them, together with the cystoscope, from the sheath 9, then pulls the catheters out of the tubes 36, 37, and disconnects the clip 50 from the cystoscope barrel.

25 The cystoscope alone, that is, without the catheters and guide, may be thrust through the sheath 9 as indicated in Fig. 7, and in such event the barrel of the cystoscope assumes a definite position within the upper half of the bore 10, the bottom half of this bore being unobstructed. With the cystoscope in place the barrel 29 always occupies this exact position, whether the catheters and guide be present or not. This may be understood from Figs. 4 and 7.

30 With the parts arranged as indicated in Fig. 7, an operating instrument of suitable form can be thrust through the tube 35 and thus guided into the bore 10, and then gently inserted farther until its free end protrudes from the opening 14.

35 One form of operating instrument, suitable for this purpose and known as forceps, is shown in Figs. 7 and 8. This instrument comprises a flexible body portion 55 and

handle 56, both of tubular form. Through the body portion and handle extends an actuating wire 57, to which is connected a pair of jaws 58. For securing the wire and tightening it there is a thread 59 and nut 60. 70

Any other form of operating instrument, however, may be used, provided only that it will admit of insertion through the tube 35 and bore 10.

The operation of my device is as follows: 75

For purposes of catheterization, the parts are arranged as above described with reference to Figs. 1 and 2. The operator now grasps the ends of the catheters protruding from the tubes 36, 37, and by pulling the catheters he moves them slightly endwise, so that their opposite ends are housed within the adjacent end of the sheath. 80

The instrument is next inserted through the urethra and into the bladder. Next the incandescent lamp is caused to glow, electric current for this purpose being supplied through the electrical connections which are in turn energized from any suitable source of current. 85 90

The operator now looks through the cystoscope and by manipulation of the catheters he inserts them into the ureters or into engagement with different physiological parts in which the existence of disease is suspected. He thus makes a thorough exploration. He may use one or both catheters, as he may see proper, and he has a direct view of the parts as pressed open or otherwise manipulated by the catheter or catheters. 95 100

Having thus determined the seat of the disease, the operator may conclude to use the operating instrument. For this purpose he actuates the clutch in order to release the closure plug 33 and then withdraws this closure plug, together with the cystoscope barrel and parts carried thereby. He next disconnects the guide and catheters, and then replaces the closure plug, together with the cystoscope barrel carried by it, and actuates the clutch so as to again lock the closure plug in position. This leaves the apparatus in the condition indicated at the right of Fig. 7, the cystoscope barrel occupying the upper half of the bore 10. 105 110 115

The operator now inserts the operating instrument. If this happens to be the forceps above described, he inserts the jaws 58 through the tube 35 and by feeding the body portion 55 into this tube a sufficient distance, he brings the jaws 58 out toward the free end of the sheath. Next the operator inserts the sheath and its accompanying parts through the urethra and into the bladder. The incandescent lamp is next caused to glow, and as the operator looks through the cystoscope he actuates the operating instrument. Suppose he sees in the bladder or in one of the uterers a gall stone. He so actuates the operating instrument as to 120 125 130

cause the jaws 58 to clasp the stone, which thereupon is easy to dislodge by simply pulling upon the operating instrument. This done, the entire apparatus is removed 5 bodily, the gall stone coming out with the forceps.

Other operating instruments of different kinds may be thus used for different purposes, as for instance treatment of lesions by 10 means of an electric spark or by local application of medicines.

I do not limit myself to the precise mechanism here shown, as variation therein may be made without departing from the spirit 15 of my invention.

I claim:—

1. The combination, with a sheath carrying a lamp and provided with a bore, of a cystoscope detachably supported by said 20 sheath and provided with a barrel portion extending through said bore, a guide detachably secured to said barrel portion of said cystoscope and provided with a partitioning member, and a plurality of flexible operating 25 members to be thrust through said bore and guided by said partitioning member.

2. The combination, with a sheath carrying a lamp and provided with a bore, of a cystoscope mounted upon said sheath for enabling the operator to see through said bore, 30 and a guide detachably mounted upon said cystoscope and located within said bore, said guide having a rib and a pair of wings for the purpose of partitioning off different portions 35 of said bore.

3. In a device of the character described the combination, with a sheath carrying a lamp and provided with a longitudinal bore, of a closure plug for fitting into said bore, 40 and a cystoscope supported by said closure plug for enabling the operator to see through said bore, said closure plug being provided with means for enabling flexible operating members to be thrust through it and into 45 said bore, and guiding mechanism located within said bore for guiding said flexible operating members therein.

4. In a device of the character described the combination, with a sheath carrying a 50 lamp and provided with a bore, of a closure plug detachably engaging said sheath, a cystoscope carried by said closure plug and extending through said bore whenever said closure plug is in fitting engagement with 55 said sheath, a guiding tube carried by said closure plug for directing an operating instrument into the bore of said sheath, a longitudinal guide provided with means for detachably securing it upon said cystoscope in 60 order to facilitate the introduction of said guide along with said cystoscope into said bore when said operating instrument is not in use, and a pair of guiding tubes carried by said closure plug to facilitate the introduction 65 into said bore, and into sliding en-

gagement with said longitudinal guide, of a pair of flexible catheters.

5. In a device of the character described the combination of a sheath carrying a lamp and provided with a bore, a cystoscope for 70 extending through said bore, means for guiding into said bore a pair of flexible catheters, and a guide removably housed within said bore in order to facilitate the travel of 75 flexible exploring members through said bore, said guide being for this purpose provided with a partition and with rounded portions extending from said partition.

6. In a device of the character described the combination of a sheath provided with a 80 bore, a closure plug detachably engaging said sheath and provided with a passage for communicating with said bore whenever said closure plug is in fitting engagement with 85 said sheath, said closure plug being also provided with a guiding tube communicating with said passage in order to facilitate the introduction of an operating instrument 90 through said passage and into said bore, said closure plug being further provided with a plurality of additional guiding tubes communicating with said passage to facilitate 95 the introduction of flexible exploring members through said passage and into said bore while said operating member is not in said bore, and a guide to be fitted into said bore while said operating instrument is absent from said bore, said guide having a 100 partition for demarking the respective paths of travel of said flexible exploring members, and also having a fin for extending into said passage and serving therein as a partition for guiding said flexible exploring members through said passage.

7. The combination, with a sheath carrying 105 a lamp and provided with a bore, of a closure plug engaging said sheath, a cystoscope carried by said plug and extending through said bore, and a guide provided with means for detachably holding it upon 110 said cystoscope, for the purpose of guiding transient exploring members when thrust into said bore.

8. In a device of the character described the combination, with a sheath carrying a 115 lamp and provided with a longitudinal bore, of a closure plug for fitting into said longitudinal bore, a cystoscope extending through said closure plug and supported thereby, a 120 guide separate from said cystoscope and detachably mounted thereupon for extending into said bore, and a plurality of guiding tubes carried by said closure plug and provided with a plurality of passages merging 125 together for the purpose of guiding transient members into said bore when said closure plug is fitted into said bore.

9. In a device of the character described the combination, with a sheath carrying a 130 lamp and provided with a longitudinal bore,

of a closure plug for fitting into said bore and a cystoscope supported by said closure plug for enabling the operator to see through said bore, said closure plug being provided with a central passage and with means for guiding flexible operating members through said central passage and into said bore, and a guide detachably mounted upon said cysto-
scope for extending therewith into said bore when said closure plug is fitted into said bore, said guide having a fin for extending into said central opening of said closure plug in order to guide the flexible operating members.

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