

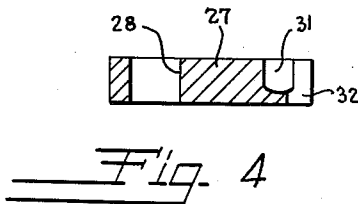
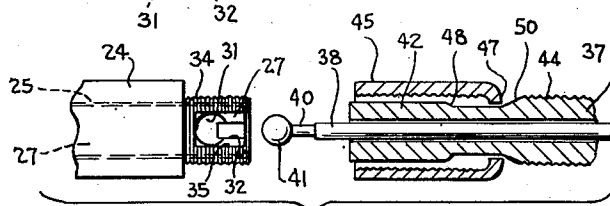
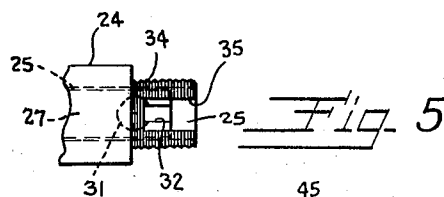
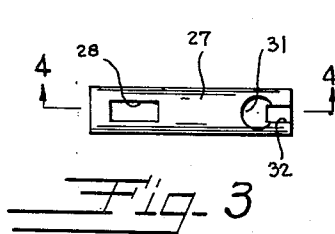
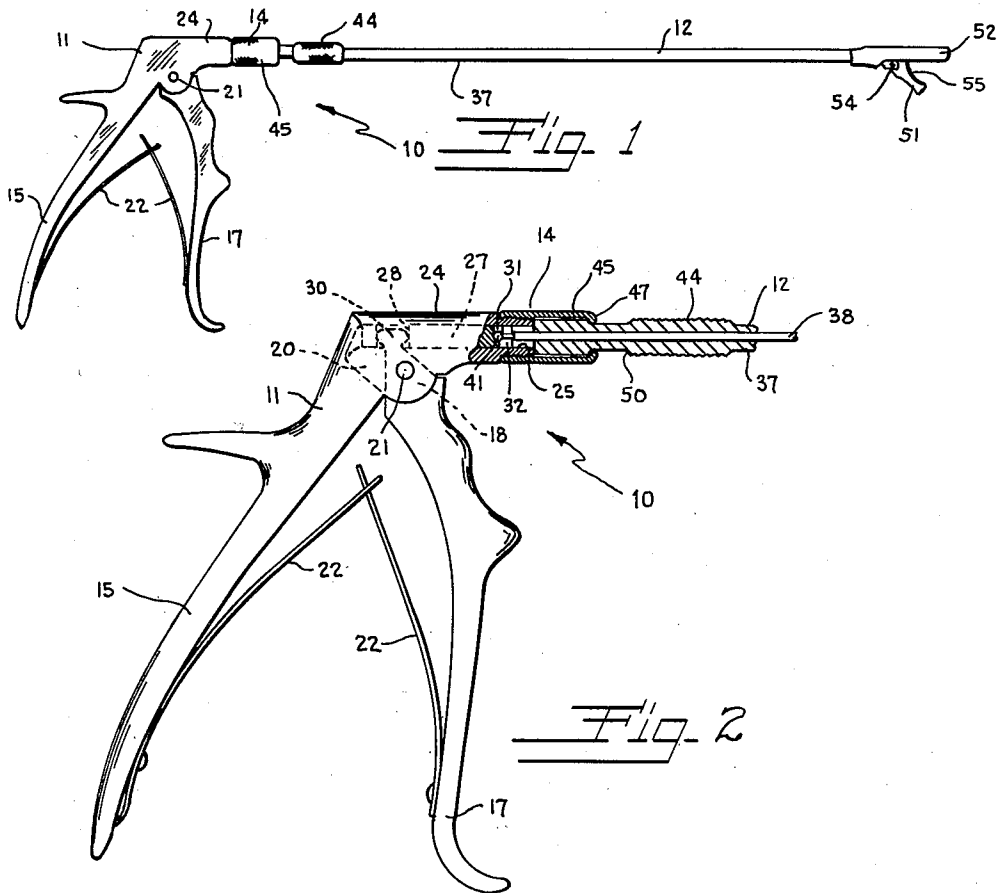
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SURGICAL INSTRUMENT

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2,790,437

SURGICAL INSTRUMENT

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This invention relates generally to surgical instruments, and has particular reference to instruments of the type used for the removal of tissue from a body cavity for biopsic purposes. Briefly stated, the invention contemplates the provision of an improved biopsy punch, or the like, having a novel separable connection between the handle and body entering portion of the instrument.

At the present time, most biopsy punches are made so that the handle and body entering portion of the instrument are permanently joined together and cannot be separated. This construction has the disadvantage of requiring practitioners to provide themselves with a number of complete instruments of various sizes and shapes even though the handle portion is the same in each one. In addition, such a construction requires the sterilization of the entire instrument after each use rather than just the portion thereof that has entered the body, and thus necessitates the provision of an expensive corrosion resistant handle which will not be damaged by the sterilization process.

In so far as the applicant is aware after a considerable amount of research on the problem, the only presently available biopsy punch having a separable connection between the handle and body entering portion of the instrument is one of German design wherein the parts are releasably secured together by means of a knurled knob or nut which threadedly engages a projecting screw on the body entering portion after the screw has passed through a bore in the handle. This arrangement, while permitting disengagement of the parts, is not entirely satisfactory since the securing knob must be completely removed each time the instrument is taken apart and frequently becomes mislaid or lost; furthermore, the exposed threads on the body entering portion screw are easily damaged during sterilization.

In order to eliminate the disadvantages above referred to, it is the primary object of the present invention to provide a biopsy punch, or like surgical instrument, having a separable connection between the handle and body entering portion of the instrument whereby the handle can be used interchangeably with body entering portions of different sizes and shapes, and the latter can be separately sterilized after the instrument has been used.

Another important object of the invention is to provide a biopsy punch or the like having a separable connection between the handle and body entering portion of the instrument wherein the coacting parts of the connection are permanently secured to the two main components of the instrument so that there are no independent small parts which can become mislaid or lost when the instrument is disassembled.

A further important object of the invention is to provide a biopsy punch or the like having a separable connection between the handle and body entering portion of the instrument which permits the body entering portion to be locked in any rotationally adjusted position relative to the handle.

Still another important object of the invention is to pro-

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vide a biopsy punch or the like having separable connection means between the handle and body entering portion of the instrument which connection means can be quickly and easily assembled and disassembled.

A still further important object of the invention is to provide a biopsy punch or the like wherein the handle and body entering portion of the instrument are releasably secured together by connection means of strong and durable construction, the coacting parts thereof being arranged so that the possibility of any damage thereto during sterilization or the like is reduced to a minimum.

Other objects and advantages of the invention will become apparent from the following detailed description thereof read in conjunction with the accompanying drawings which illustrate a typical embodiment of the invention for the purpose of disclosure.

In the drawings:

Figure 1 is a side elevation of a biopsy punch or like surgical instrument embodying the invention;

Figure 2 is an enlarged fragmentary elevation corresponding to Figure 1, a portion thereof being shown in section to illustrate the details of the separable connection between the handle and body entering portion of the instrument;

Figure 3 is a top plan view of the reciprocable handle plunger;

Figure 4 is a vertical section through the handle plunger taken along line 4—4 of Figure 3;

Figure 5 is a fragmentary top plan view of the connection means of the handle, showing the handle plunger in retracted position; and

Figure 6 is an exploded assembly view in top plan of the separable connection between the handle and body entering portion, the latter being shown in section.

Having reference now to the drawings, wherein like reference numbers designate the same part in each of the views, 10 generally indicates the biopsy punch which comprises a handle portion 11 and a body entering portion 12, the two portions being releasably secured together by means of a connection 14 to be described in detail hereinafter. The handle 11 includes fixed and movable hand grip members 15 and 17, the upper end 18 of the movable member being received in a centrally disposed, vertical slot 20 in the fixed member and being pivotally secured thereto at the pivot point 21. The hand grip members are normally biased apart by interlocking spring elements 22 which are respectively secured at their lower ends to the lower ends of the hand grip members as shown.

The fixed hand grip member 15 is formed with a substantially cylindrical portion 24 which projects outwardly from the upper end thereof, and a bore 25 extends longitudinally into this cylindrical portion from its outer end. Slidably mounted in the bore 25 for reciprocable movement therein is a cylindrical plunger 27 which is formed adjacent its inner end with a vertically disposed, closed slot 28. This slot loosely receives an upstanding ear 30 on the upper end 18 of the movable hand grip member 17 so that pivotal movement of the latter imparts longitudinal sliding movement to the plunger.

Spaced inwardly a short distance from the outer end of the plunger 27 is a round bottomed bore or socket 31, and a vertical, diametral slot 32 extends inwardly from the outer end and cuts into the socket, the width of the slot being less than the diameter of the socket, as shown.

The outer end of the cylindrical portion 24 of the handle is threaded as at 34 for a purpose to be described hereinafter, and the cylinder wall is cut away at the upper side of these threads to form an opening or slot 35 in communication with the bore 25 in which the plunger 27 is mounted. The length of the reciprocable plunger is such that when it is in its outermost position in the bore 25, the socket 31 in the plunger is in registration

with the opening 35, as shown in Figure 6, and when it is in its retracted position, the socket is out of registration with the opening, as shown in Figure 5. Thus, the socket 31 is inaccessible when the movable hand grip member 17 is held in its normal forward position by the spring elements 22, and is accessible through the opening 35 when the movable hand grip member is moved rearwardly by squeezing it against the fixed member 15.

The body entering portion 12 of the biopsy punch comprises an elongated tubular rod 37 having a smaller rod or plunger 38 mounted for reciprocable movement in the central passage therethrough. The inner end of the plunger 38 extends beyond the inner end of the rod 37 and is formed with a necked down portion 40 which terminates in a ball 41. The ball is adapted to engage in the socket 31 in the handle plunger 27, and necked down portion 40 being received with a free fit in the slot 32 during such engagement so that a ball and socket connection is provided between the two plungers. However, the ball may be engaged in or disengaged from the socket only when the handle plunger is in its outermost position and the socket is in registration with the opening 35, the parts being locked together when the handle plunger is in its retracted position.

The tubular rod 37 is formed adjacent its inner end with a thickened portion 42, or band of increased diameter, and spaced outwardly a short distance from this band is a second band 44 of equal diameter having a knurled surface, as shown. An internally threaded sleeve member 45 is loosely mounted on the inner end of the rod 37 for longitudinal sliding movement relative thereto, and the outer end of the sleeve is turned in as at 47 so that the sleeve is limited in its sliding movement by the opposed annular shoulders 48, 50 on the bands 42 and 44 respectively. When the ball 41 is engaged in the socket 31, the sleeve 45 is moved rearwardly on the rod 37 and threaded onto the threads 34 of the instrument handle, the sleeve thus serving to complete the separable connection 14 between the handle and body entering portion of the instrument by completely enclosing the ball and socket connection and providing the necessary rigidity between the parts.

The ball and socket connection between the plungers 27 and 38 permits rotational adjustment of the body entering portion relative to the handle, and after the former has been moved to the desired angular position it can be locked in such position by the sleeve 45. This is accomplished by holding the body entering portion in the desired position by means of the knurled band 44 and then tightening the sleeve as far as it will go on the threads 34. This causes the turned in end 47 of the sleeve to bear against the shoulder 48 and force the inner end of the rod 37 against the outer end of the handle cylindrical portion 24, as indicated in Figure 2, so that no further relative rotation between the parts can occur.

At its outer end, the rod 37 is provided with a pivotally mounted cutting member or blade 51 which is adapted to move into engagement with a fixed member 52, the tissue specimen being severed by the cutting member and then clamped between it and the fixed member while the punch is being removed from the body cavity. Cutting member 51 is actuated by the plunger 38, and is pivotally secured thereto as by the connection 54. In the disclosed embodiment of the invention, the cutting edge 55 of the member 51 is arcuately formed as shown, since it has been found that this type of edge enables the cut to be made in the sharpest, most precise possible manner.

In operation, a body entering portion 12 of the desired length and shape is selected and attached to a handle 11 by squeezing the fixed and movable hand grip members 15, 17 together to move the socket 31 in the handle plunger into registration with the opening 35 so that the ball 41 can be engaged therein. The movable hand grip member is then released to lock these parts together and the sleeve 45 is threaded onto the handle

threads 34 after the body entering portion has been adjusted to the desired angular position as above described. When the instrument is thus assembled, pivotal movement of the movable hand grip member will be transmitted through the ear 30, handle plunger 27 and body entering portion plunger 38 to the cutting member 51, the latter being held in its open position when the plungers are maintained in their normal retracted positions by the action of the spring elements 22, as shown in Figure 1, and being moved to closed position when the movable hand grip member is moved rearwardly or squeezed against the fixed member so that the plungers move to their outermost positions. The hand grip members are therefore squeezed together when the instrument is being inserted into the cavity, released to open the cutting member, squeezed together again to make the cut, and held in this position while the instrument is being removed from the cavity. After the tissue specimen has been obtained the instrument is disassembled, and the body entering portion thereof is sterilized in the usual manner.

From the foregoing description, it will be apparent that the invention provides a novel and highly practical biopsy instrument having a separable connection between the handle and body entering portion thereof. This separable connection permits a single handle to be used interchangeably with body entering portions of different sizes and shapes, and permits separate sterilization of the latter. The body entering portion is constructed so that there are no exposed threads or the like such as might be damaged during sterilization, and no detachable parts which might become mislaid or lost. The separable connection also provides for rotational adjustment of the body entering portion relative to the handle, and for locking these parts together in the desired adjusted position.

The invention may be embodied in other specific forms without departing from the spirit of essential characteristics thereof. The embodiment disclosed is therefore to be considered in all respects as illustrative rather than restrictive, the scope of the invention being indicated by the appended claims.

What is claimed is:

1. In a surgical instrument having a body entering portion and an operating handle therefor, separable connection means between said portion and handle including a reciprocable plunger mounted in the handle having a socket adjacent the outer end thereof, and a reciprocable plunger mounted in said body entering portion and terminating at its inner end in a ball positioned in said socket, said ball being removable from the socket when said handle plunger is projected outwardly relative to the handle and being locked in the socket when said plunger is withdrawn into the handle.

2. In a surgical instrument having separable handle and body entering portions, connection means for said portions comprising a reciprocable plunger in said handle portion having a socket adjacent the outer end thereof, said socket being inaccessible when said plunger is retracted within the handle portion and accessible when the plunger is projected outwardly therefrom, a second reciprocable plunger in said body entering portion terminating at its inner end in a ball adapted to be received in said socket, said ball being engageable with and disengageable from said socket when said handle plunger is in its outwardly projected position and being locked in the socket when said plunger is in its retracted position, and means on said body entering portion engageable with said handle portion to enclose said ball and socket when the latter are engaged.

3. In a surgical instrument having a body entering portion and an operating handle therefor, said handle being formed with a longitudinally extending bore adjacent the upper edge thereof, separable connection means between said portion and handle including a reciprocable plunger mounted in said bore, a second reciprocable plunger in said body entering portion, coaxing means on said plunger

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ers to operably secure them together, said means being separable when said handle plunger is moved outwardly in said bore and being locked together when said plunger is moved inwardly in the bore, and a sleeve member slidably mounted on said body entering portion and engageable with said handle to enclose said coacting plunger means and prevent separation thereof when said handle plunger is moved outwardly in said bore.

4. In a surgical instrument having a body entering portion and an operating handle therefor, said handle including a cylindrical portion having a longitudinally extending bore therein, said cylindrical portion being partially cut away to form an aperture in communication with said bore, separable connection means between said portion and handle comprising a reciprocable plunger mounted in said bore having a socket adjacent the outer end thereof, said socket being moved into and out of registration with said aperture when said plunger is respectively moved outwardly and inwardly in said bore, and a second reciprocable plunger in said body entering portion terminating at its inner end in a ball positioned in said socket, said ball being disengageable from the socket when the latter is in registration with said aperture and being locked in the socket when it is out of registration with the aperture.

5. In a surgical instrument having a body entering portion and an operating handle therefor, a reciprocable plunger mounted in said handle having a socket adjacent the outer end thereof, a second reciprocable plunger mounted in said body entering portion having a ball at the inner end thereof positioned in said socket, said ball and socket connection permitting rotational adjustment of said body entering portion relative to said handle, a sleeve member slidably mounted on said body entering portion and engageable with said handle to enclose said ball and socket, and means on said body entering portion coactable with said sleeve member during such engagement to hold said body entering portion in rotationally adjusted position.

6. In a biopsy instrument having a body entering portion and an operating handle therefor, said handle being formed with a longitudinally extending bore adjacent the upper edge thereof, a reciprocable plunger mounted in said bore having a socket adjacent the outer end thereof, a second reciprocable plunger mounted in said body entering portion and terminating at its inner end in a ball positioned in said socket, said ball being removable from the socket when said handle plunger is moved outwardly in said bore and being locked in the socket when said plunger is moved inwardly in the bore, and a cutting member pivotally secured to the outer end of said body entering portion and operably connected to said second plunger, said cutting member having a substantially arcuate cutting edge.

7. In a biopsy instrument having a body entering portion and an operating handle therefor, said handle including coacting fixed and movable hand grip members, a reciprocable plunger mounted in said handle and actuated by said movable hand grip member, said plunger

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having a socket adjacent the outer end thereof, a second reciprocable plunger mounted in said body entering portion having a ball at the inner end thereof positioned in said socket, said ball being removable from the socket when said handle plunger is projected outwardly relative to the handle and being locked in the socket when said plunger is withdrawn into the handle, said ball and socket connection permitting rotational adjustment of said body entering portion relative to said handle, a sleeve member slidably mounted on said body entering portion and engageable with said handle to enclose said ball and socket, means on said body entering portion coactable with said sleeve member during such engagement to hold the body entering portion in rotationally adjusted position, and a cutting member pivotally secured to the outer end of said body entering portion and operably connected to said second plunger, said cutting member having a substantially concave cutting edge.

8. In a biopsy instrument having a body entering portion and an operating handle therefor, said handle including coacting fixed and movable hand grip members, said fixed hand grip member being formed with an outwardly extending cylindrical portion adjacent the upper end thereof, said cylindrical portion having a longitudinally extending bore therein and being partially cut away adjacent its outer edge to form an open slot in communication with said bore, a reciprocable plunger mounted in said bore and actuated by said movable hand grip member, said plunger having a socket adjacent the outer end thereof movable into and out of registration with said slot when the plunger is respectively moved outwardly and inwardly in said bore, a second reciprocable plunger in said body entering portion terminating at its inner end in a ball positioned in said socket, said ball being disengageable from the socket when the latter is in registration with said slot and being locked in the socket when it is out of registration with the slot, said ball and socket connection permitting rotational adjustment of said body entering portion relative to said handle, a sleeve member slidably mounted on said body entering portion and engageable with said handle to enclose said ball and socket and prevent disengagement thereof when said socket is in registration with said slot, an annular shoulder on said body entering portion coactable with said sleeve member when the latter is engaged with the handle to hold the body entering portion in rotationally adjusted position, and a cutting member pivotally secured to the outer end of said body entering portion and actuated by said second plunger, said cutting member having a substantially concave cutting edge.

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