

July 27, 1965

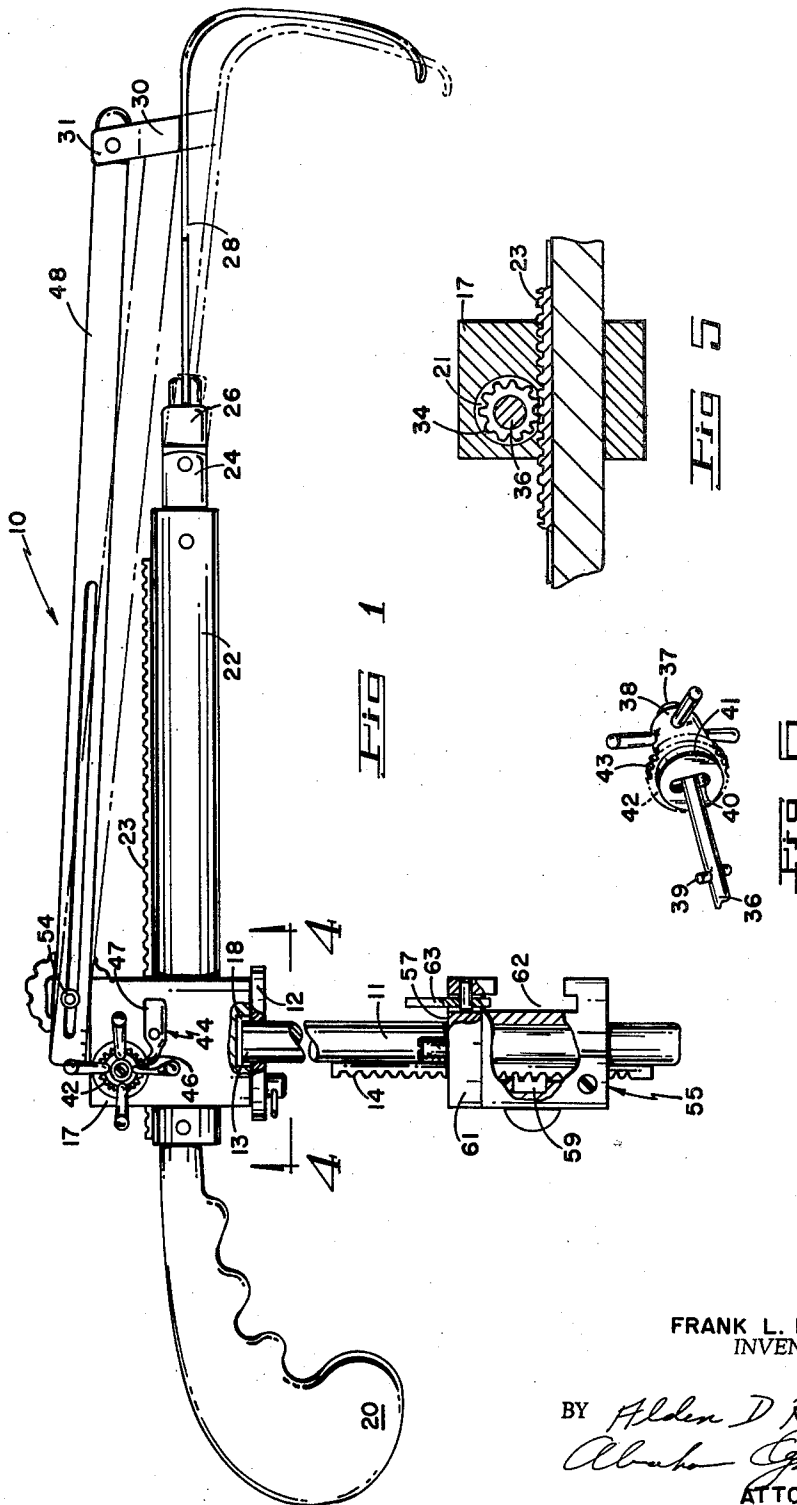
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SELF-RETAINING RETRACTOR

Filed Feb. 6, 1963

2 Sheets-Sheet 1



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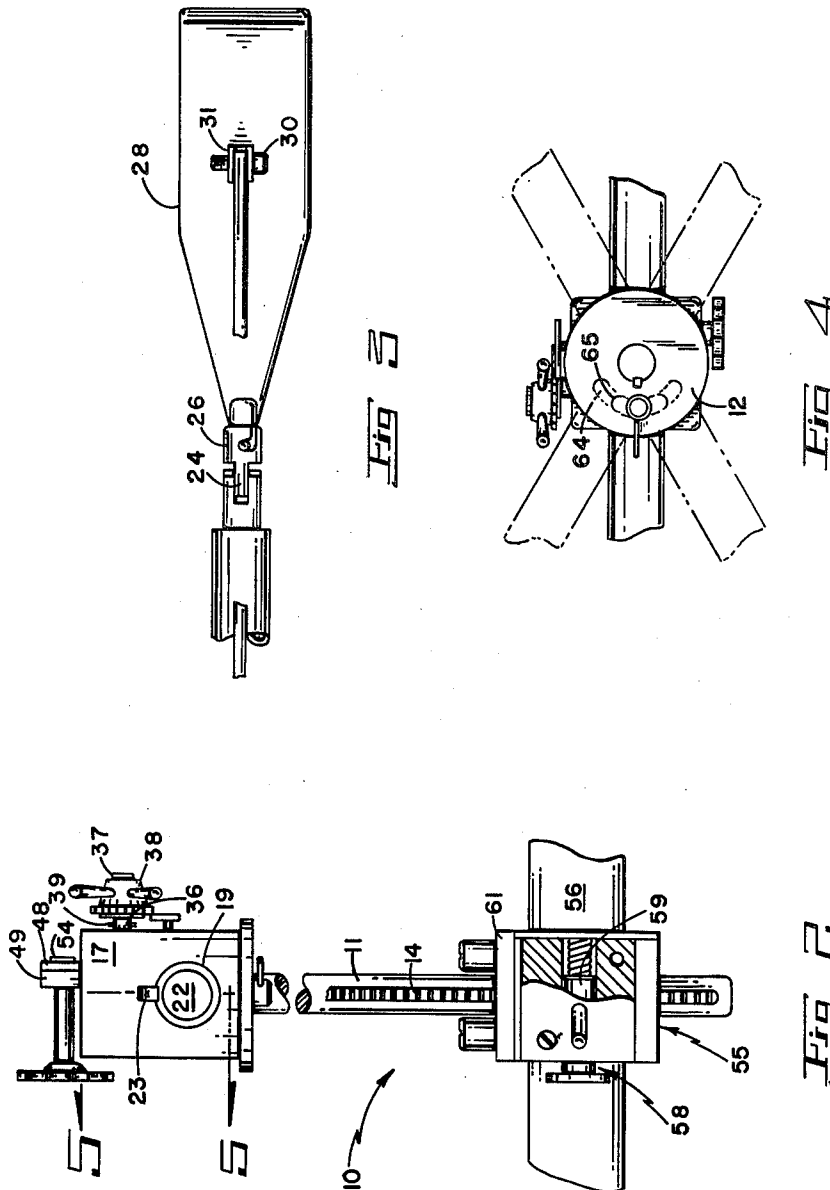
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SELF-RETAINING RETRACTOR

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Filed Feb. 6, 1963, Ser. No. 256,636
10 Claims. (Cl. 128—20)

This invention relates to a surgical appliance and more particularly to a self-retaining retractor.

In many surgical procedures, there arises a need for a retractor to draw back the muscular tissue defining an incision to enable a surgeon to reach an internal body organ. The most widely used type of retractor is a hand retractor manipulated by a surgeon's assistant who, typically, is also a skilled surgeon. Hand retraction makes it virtually impossible to utilize the full capabilities of the skilled assistant. It is a tedious task and frequently gives rise to interference between the person handling the retractor and the surgeon.

Prior art also discloses various designs of self-retaining retractors which are mounted to the operating table for the purpose of performing a retraction procedure without the constant attention of an attendant. Typical prior art designs were not satisfactory for one reason or another. Generally, they were awkward to manipulate and awkward in their design. None of the prior art devices is in widespread use today.

It is an object of the invention to provide a self-retaining retractor which avoids the limitations and disadvantages of prior art devices of this type.

It is another object of the invention to provide a self-retaining retractor which may be easily adjusted and placed into use and thereafter requires no further attention except for necessary minor adjustments arising from the progress of the surgical procedure.

It is yet another object of the invention to provide a self-retaining retractor which may be easily disassembled and sterilized in relatively small and widely available sterilizing units.

It is still another object of the invention to provide a self-retaining retractor which is adjustable in three mutually orthogonal planes in a simple and facile manner.

Another object of the invention is to provide a self-retaining retractor which includes means for mounting the retractor in an adjusted position.

It is still another object of the invention to provide a self-retaining retractor which includes means for applying a downward force in combination with the retracting force for achieving a more reliable grip on the incision wall.

In accordance with the invention, a self-retaining retractor comprises an axially extendible and retractable arm terminated in a hinged retractor. It also includes means joined to the retractor which respond to the axial movement of the arm for pivoting the retractor. A support means for the arm, which includes means for adjusting the elevation and the horizontal position of the arm, is also provided. The self-retaining retractor also includes means for adjusting the axial position of the arm and for maintaining it fixed in the adjusted position. A simple mounting means is provided for securing the support means to a surgical table.

The novel features that are considered characteristic of the invention are set forth in the appended claims; the invention itself, however, both as to its organization and method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in conjunction with the accompanying drawings in which:

FIGURE 1 is a side view of a self-retaining retractor embodying the principles of the present invention;

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FIGURE 2 is a rear side view of the FIGURE 1 embodiment;

FIGURE 3 is a fragmentary view showing the front portion of the arm;

FIGURE 4 is a fragmentary bottom view showing the horizontal adjusting means;

FIGURE 5 is a sectional view taken along line 5—5; and

FIGURE 6 is an enlarged view of the adjusting means.

Referring to FIGURE 1 of the drawings, there is depicted a side view of a self-retaining retractor generally designated 10. The self-retaining retractor 10 includes a vertically extending rod 11 with an enlarged diameter disc 12 spaced from its upper end 13. The rod 11 also includes a rack 14 extending axially along the surface thereof.

The disc 12 has an arcuate slot 16 defined therein adjacent to its circumference as depicted in FIGURE 4.

The self-retaining retractor 10 also includes a turret 17 comprising a block of metal. Defined within the turret 17 are three mutually orthogonal passages 18, 19, and 21 (see FIGURES 1, 2, and 5, respectively). As seen in FIGURE 1, the passage 18 is centrally located in the bottom of block 17 for receiving the end 13 of the rod 14.

An arm 22 is shaped to conform to passage 19 and inserted in passage 19. The arm 22 also includes a rack 23 secured to its surface and a handle 20 at one end thereof. The cantilevered end of arm 22 includes a hinge 24 from which extends a bayonet receptacle 26 (see FIGURE 3) in which is inserted, by means of a complementary bayonet fitting, a retractor 28. The retractor 28 is conventionally shaped and is fabricated in this instance of a suitable metal such as aluminum or stainless steel. In the alternative, the retractor may be formed from a light transmitting plastic such as Lucite if the retractor 28 is intended to supply light to the inside of the cavity. Extending from the upper surface 29 of the retractor 28 is a bifurcated support 31 which includes in axial alignment a clearance hole and a threaded hole (not shown) through which a bolt 30 is threaded.

Returning to the turret 17 and more particularly FIGURE 5, it is seen that a pinion 34 is inserted in passage 21 and engages the rack 23. Extending through and from the pinion 34 is a shaft 36 (see FIGURES 2, 5, and 6) which is terminated in an enlarged diameter head 37 (see FIGURE 2). A capstan-like knob 38 is slidably mounted on the shaft 36. The shaft 36 includes a transverse pin 39 (see FIGURES 2 and 6) passing through it at a predetermined point along its length. A surface 41 (see FIGURE 6) on knob 38 adjacent to the pin 39 includes a complementary recess 40 designed to slide over the pin 39. Adjacent to surface 41 on the surface of knob 38 is a circumferentially raised ratchet wheel 42 formed by a plurality of triangularly shaped teeth 43.

It is quite obvious from the foregoing description that the knob 38 slides over the shaft 36 between two extreme positions, the first defined by the enlarged diameter head 37 and the other by the pin seated in the complementary recess 40. A pawl 44 containing a point 46 adapted to engage the teeth 43 is secured to the turret 17. The pawl 44 is spaced from the turret 17 to engage the teeth 43 when the knob 38 engages the teeth 43. The end 47 diametrically opposite from the point 46 is weighted to cause the point 46 to bear against the teeth 43 by the force of gravity.

The self-retaining retractor 10 also includes a slotted bar 48 which is secured to the support 31 at one end by means of bolt 30 and slidably mounted to an extension 49 of turret 17 by means of a pin passing through a slot 52 and the extension 49 into a knob 53. By actuating the knob 53, a head 54, on the pin can be made to bear

against the bar to prevent relative movement between the extension 49 and the bar 48.

Finally, the self-retaining retractor 10 includes means 55 adapted to mount the self-retaining retractor 10 to the horizontal bar 56 of a surgical table. The mounting means 55 includes a passage 57 dimensioned to conform with the rod 11 and rack 14 inserted therein. A spring-loaded latch 58 includes a geared portion 59 positioned in the mounting means 55, so that it normally engages the rack 14 for preventing relative movement between the rack 14 and the rod 11 attached thereto, and the mounting means 55. The geared portion 59 is moved laterally when the latch 58 is depressed allowing rod 11 and rack 14 to move through the passage 57. The mounting means 55 is secured to the horizontal bar 56 by removing a cap 61 and inserting the horizontal bar 56 in the channel 62. The movement between the mounting means 55 and the horizontal bar 56 may be prevented by actuating the offset cam handle 63 bringing a portion of the surface of the cam handle 63 into contact with the horizontal bar 56.

It is seen in FIGURE 4 that the disc 12 includes an arcuate slot 64. A hand manipulatable bolt 65 is inserted through slot 64 and threaded into turret 17. When tightened, the head of bolt 65 bears against the disc 12 to prevent relative movement between the turret 17 and the disc 12.

The operation of the self-retaining retractor 10 is as follows:

Assuming it is mounted to a surgical table, the spring-loaded latch 58 is depressed to allow the turret 17 to be moved vertically. If necessary, the bolt 65 may be loosened to permit horizontal alignment of the retractor 28 by sliding the turret 17 on the disc 12. When the retractor is in the proper position, the bolt 65 is tightened preventing further rotation of the turret 17. Knob 38 is positioned against the head 37 disengaging the pawl 44 from the ratchet wheel 42, enabling the coarse adjustment of arm 22 by means of handle 20. By means of the combination of adjustments described above, the retractor 28 is inserted in an incision.

To retract the incision wall or to provide a fine adjustment of the retractor 28, the knob 53 is tightened to bring the head 54 into contact with the bar 52 to prevent relative movement therebetween. Additionally, the knob 38 is moved toward the pin 39 until the recess 40 receives the pin 39. When the knob 38 is rotated in a clockwise direction, the pinion 34 rotates on the rack 23 retracting the arm 22. Because the bar 50 cannot move relative to the turret 17, the retractor 28 pivots downwardly as the arm 22 is retracted as shown in phantom in FIGURE 1. Thus, in the process of retracting the retractor 28, an outward and downward force is brought to bear on the incision wall insuring a firm and reliable grip on the wall. The retractor is maintained in the adjusted position by pawl 44 engaging teeth 43. The adjustment will remain fixed unless some overt action is taken by the operating surgeon to readjust the position of the retractor 28.

It is quite clear from the foregoing description that the self-retaining retractor 10 may be sterilized by simply removing the bolt 65 separating the supporting rod 11 from the turret 17 separating the self-retaining retractor 10 into two elongated members which fit easily into any one of the widely available sterilizers.

It is also quite clear from the foregoing description of the construction and operation, the self-retaining retractor 10 may be operated simply. It is quite versatile since it may be adjusted in height and rotated horizontally to accommodate the nature of the incision made by the operating surgeon.

The various features and advantages of the invention are thought to be clear from the foregoing description. Various other features and advantages not specifically enumerated will undoubtedly occur to those versed in the art, as likewise will many variations and modifications of the

preferred embodiment illustrated, all of which may be achieved without departing from the spirit and scope of the invention as defined by the following claims.

I claim:

1. A self-retaining retractor assembly comprising:

- (a) a longitudinally extendable and retractable arm terminated at one end in a pivot means;
- (b) a retractor joined to said arm by said pivot means;
- (c) support means movably supporting said arm, including means for adjusting the elevation and the horizontal position of said arm;
- (d) means joined to both said retractor and support means responsive to the axial movement of said arm for pivoting said retractor;
- (e) means for adjusting the longitudinal position of said arm; and
- (f) means on said support means adapted to secure said support means to a surgical table.

2. A self-retaining retractor assembly as defined in claim 1 in which said arm adjusting means includes means for locking said arm in a longitudinally adjusted position.

3. A self-retaining retractor assembly as described in claim 1 in which said means for pivoting said retractor comprises a bar having an adjustable length pivotally connected to said retractor at one end and releasably secured to said support means at a point remote from said one end.

4. A self-retaining retractor assembly as described in claim 1 in which said means for adjusting the longitudinal position of said arm comprises a rack and pinion connected to said arm and said support means respectively.

5. A self-retaining retractor assembly as described in claim 4 which includes in addition a ratchet wheel and pawl operatively connected to said pinion and said support means, respectively, for permitting and preventing coarse adjustment of said longitudinal position of said arm.

6. A self-retaining retractor assembly comprising:

- (a) a turret;
- (b) an arm slidably connected to said turret and terminating in a hinged retractor;
- (c) rack and pinion means connected to said arm and turret, respectively, for sliding said arm;
- (d) means for locking said arm in an adjusted position;
- (e) means joined to said retractor and turret responsive to the sliding movement of said arm for pivoting said retractor;
- (f) support means for said turret including means for adjusting and maintaining said turret in a rotated position; and
- (g) means slidably engaging said support means adapted to mount said support means to a surgical table.

7. A self-retaining retractor assembly comprising:

- (a) a rod including an enlarged diameter transverse disc adjoining one end of said rod;
- (b) a rack extending longitudinally along the surface of said rod;
- (c) a turret comprising first, second, and third mutually transverse passages, said second passage being dimensioned to receive said one end of said rod;
- (d) an arm shaped to conform to said first passage and passing through said first passage, said arm including a second rack extending longitudinally along the surface of said arm;
- (e) a retractor pivotally connected to one end of said arm;
- (f) a pinion positioned in said third passage in engagement with said second rack having an axial shaft terminating in an enlarged diameter head and further including a transverse pin spaced from said pinion and said head;
- (g) a knob mounted on said shaft having a flat surface containing a recess shape to complement said pin and

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- adapted to engage said pin, said knob including a circumferential ratchet wheel;
- (h) a pawl attached to said turret for engaging said ratchet wheel to prevent rotation in one direction of said ratchet wheel when said pawl engages said ratchet wheel;
- (i) a slotted bar pivotally connected to said retractor at one end and adjustably connected to said turret by means of a pin passing through said slot, said pin including a surface adapted to bear against said rod for preventing relative movement between the turret and said rod;
- (j) an arcuate slot defined through said disc;
- (k) threaded pin means passing through said arcuate slot and threaded into said turret for permitting and preventing rotation of said turret relative to said disc;
- (l) clamp means adapted to connect to a surgical table having a central passage through which said rod and first rack pass; and
- (m) a spring-actuated fragmentary rack member normally engaging said first rack for preventing relative movement between said rod and said clamp means.
8. In a self-retaining retractor assembly having support means, positioning means movably mounted in said support means terminated in pivot means and a retractor connected to said pivot means, an improvement comprising means joining said retractor and said support means responsive to the movement of said positioning means for rotating said retractor about said pivot joint.

9. In a self-retaining retractor assembly including an arm terminated at one end by a pivot means, a retractor joined to said arm by said pivot means, support means slidably engaging said arm for positioning said retractor in an incision, an improvement comprising means interconnecting said retractor and said support means responsive to the sliding movement of said arm to rotate said retractor about said pivot means.

10. In a self-retaining retractor assembly as described in claim 9 said pivoting means comprising a bar pivotally secured to said retractor at one end and releasably secured to said support means at a point remote from said one end.

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