June 14, 1949. D. J. WEXLER 2,473,266

SELF-RETAINING ABDOMINAL RETRACTOR

Filed June 12, 1946 3 Sheets-Sheet 1

FIG. 1.

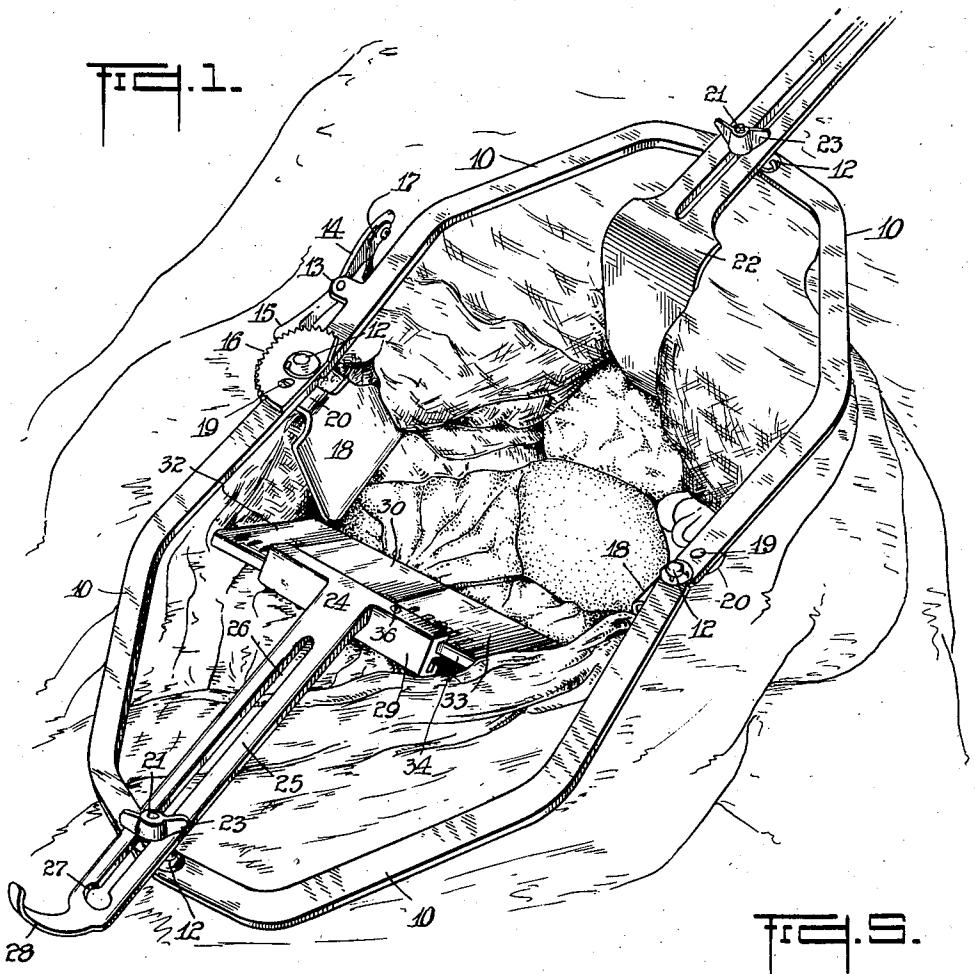


FIG. 4.

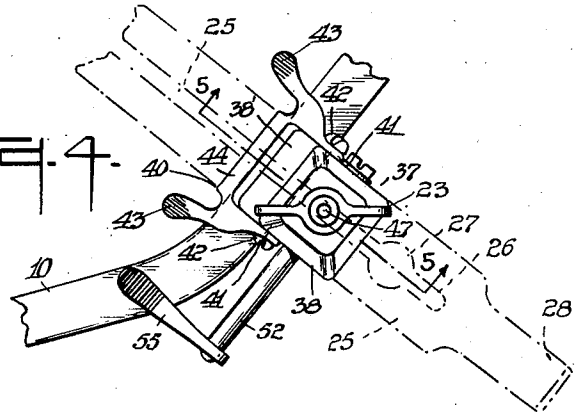
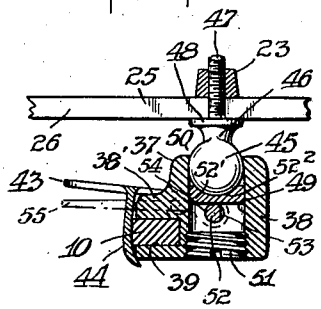


FIG. 5.



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SELF-RETAINING ABDOMINAL RETRACTOR

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FIG. 2.

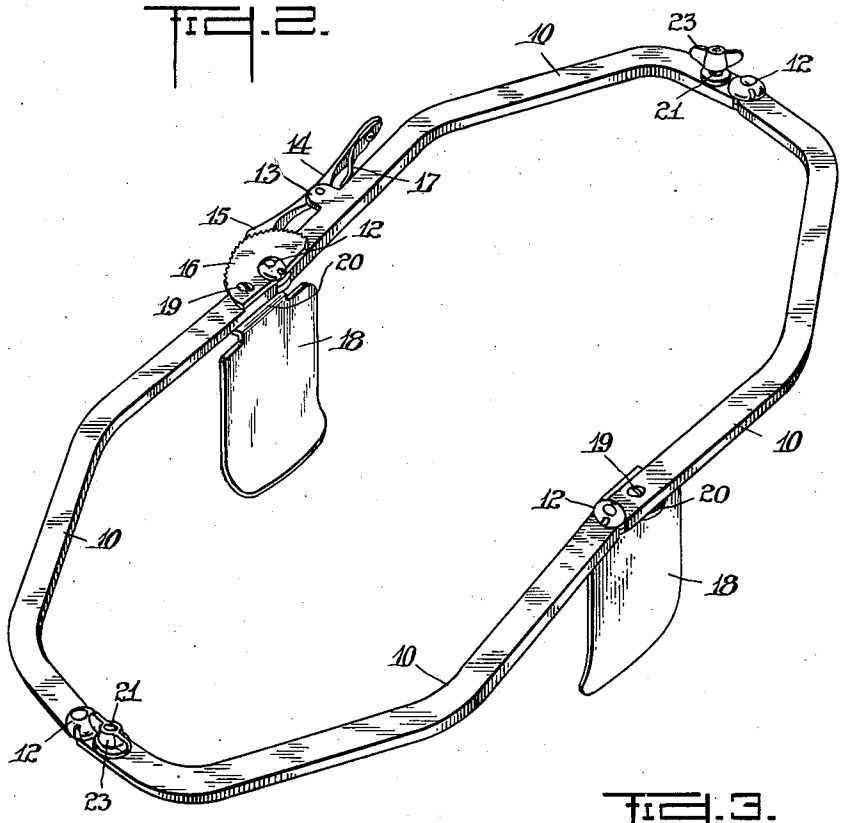
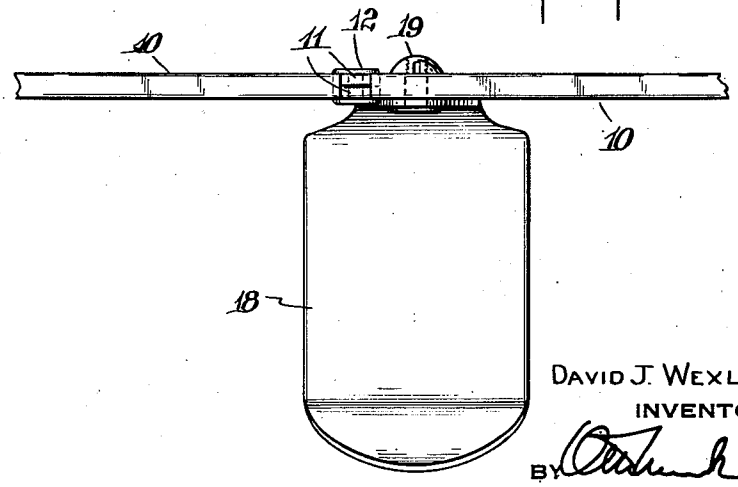


FIG. 3.



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SELF-RETAINING ABDOMINAL RETRACTOR.

Filed June 12, 1946 3 Sheets-Sheet 3

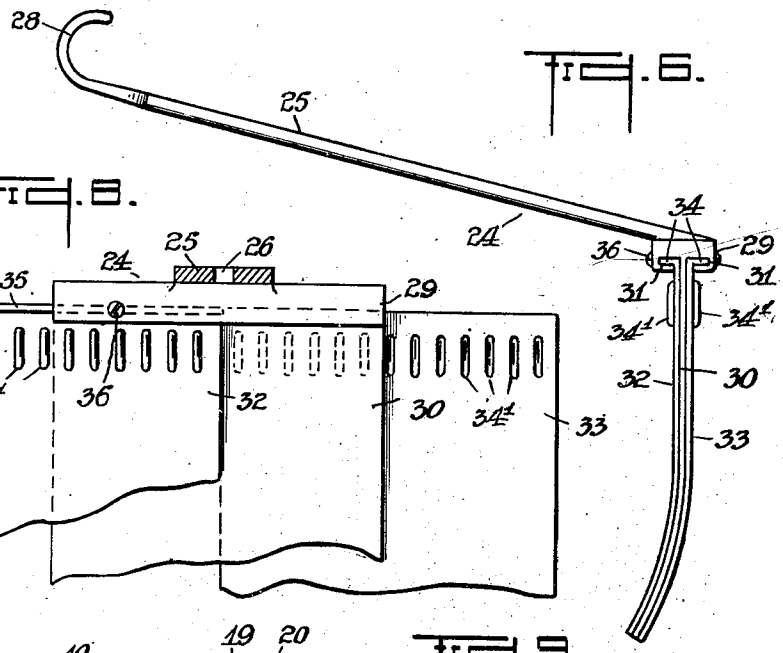


FIG. 6.

FIG. 8.

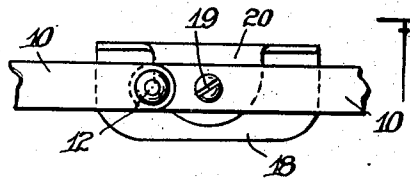


FIG. 9.

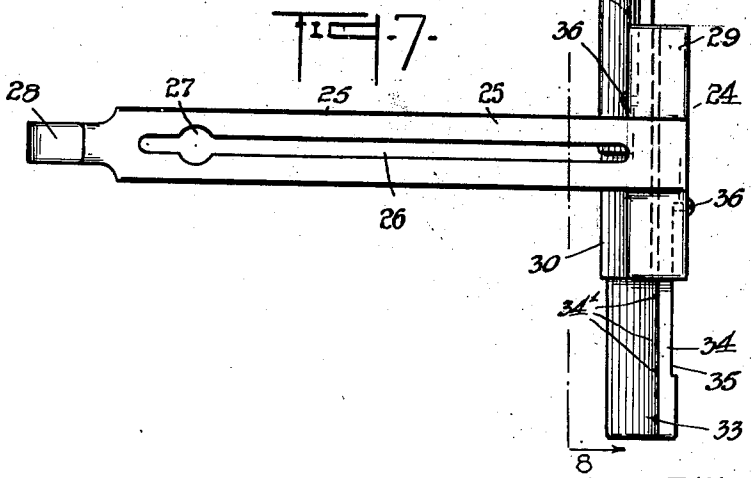
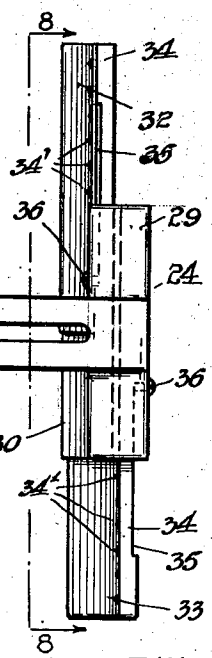


FIG. 7.



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2,473,266

SELF-RETAINING ABDOMINAL RETRACTOR

David J. Wexler, Islip Terrace, N. Y.

Application June 12, 1946, Serial No. 676,143

8 Claims. (Cl. 128—20)

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This invention relates generally to improvements in surgical apparatus and has reference particularly to the construction of abdominal self-retaining retractor consisting of adjustable frame interchangeable retractor blades therefor and universal clamping means for attaching and supporting the blades on the frame at substantially any desired angle and position.

The successful execution of surgical abdominal operations requiring complete exposure is greatly facilitated by the application of an apparatus known as a self retaining abdominal retractor. This instrument comprises generally a frame either rigid or adjustable carrying fixed and interchangeable retractor blades adapted especially to lift, retract and protect the urinary bladder and abdominal viscera; while affording the maximum viewing span possible during the performance of delicate abdominal and pelvic procedures. Heretofore, proper exposure of the abdominal viscera required either the services of assistants employing hand retractors of the so called "deep" design, or mechanical retractors which remain in the patient for the duration of the operation.

It is with the mechanical retractors that the present invention is chiefly concerned and the principal objects of this invention are to provide a highly improved adjustable frame, which is securely retained in its adjusted position by means of an improved readily controlled dog and ratchet attachment, and which consists of a plurality of pivotally connected sections and independently supported small blade fittings; and to afford supporting fittings for the "deep" retractor blades whereby the latter may be adjusted to any position along the frame and at any desired angle necessary to properly retract and protect the urinary bladder, intestinal organs and abdominal wall; and further to provide an improved retractor blade of the "deep" design which is extensible in width to accommodate the various conditions with which the surgeon is confronted in procedures of this type.

Another object of my invention is to provide a surgical apparatus of this character, embodying in its construction the means whereby the parts to be retracted and held may be properly supported at precisely the correct points regardless of the relative locations of such parts; in other words a plurality of retractor blades may be carried independently about a single frame and each is independently adjustable as to position, depth and angle to meet any requirements.

A still further object of this invention is, to afford by means of adjustment of its retractor

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blades the proper holding in place of sterile gauze packs and other media for the purpose of excluding viscera from the field of operation.

And a still further object of the present invention is to provide an improved self retaining abdominal retractor which is capable of being adjusted to circumscribe the area of the operation and to make it possible for its retractor blades to provide the proper amount of lateral displacement of the retracted parts, whereby adequate exposure may be had of the organ or organs upon which surgery is to be performed.

I accomplish the objects of my invention by means of the combinations and arrangements of parts hereinafter described, set forth in the appended claims and illustratively exemplified in the accompanying drawings, in which

Figure 1 is a perspective view of the complete device, in place upon the patient, the walls and organs exposed by an incision being illustrated as engaged by the retractor blades for the purpose of effecting the proper exposure.

Figure 2 is a perspective view of complete instrument frame with fixed blades in position;

Figure 3 is a side elevational view of a portion of the same;

Figure 4 is a plan view of a portion of the frame of the device showing a clamp in position to support a retractor blade;

Figure 5 is a substantially longitudinal sectional view of the frame and clamp taken on lines 5—5 of Figure 4.

Figure 6 is a side elevational view of an extensible deep retractor especially adapted for use with the present frame;

Figure 7 is a top plan view of the same;

Figure 8 is a substantially transverse sectional view of the retractor taken on lines 8—8 of Figure 7.

Figure 9 is a top plan view of one of the joints in the frame of the device and one of the pivotally mounted blades for retaining the walls of the abdominal cavity at the sides thereof.

Referring to the drawings and particularly to Figures 1 to 5, 10 denotes the frame of a self-retaining retractor, comprising four pivotally connected sections each of which is substantially angularly shaped and when pivotally connected together at their ends, as illustrated in Figures 2 and 3 they form an open frame which may be adjusted to accommodate the size and position of the incision. The pivotal connections of the frame sections, which are made from flat metal of substantially rectangular transverse section, are formed by providing lateral steps 11 alter-

nately disposed on different planes in adjoining sections and provided with openings to receive pivot pins 12. One arm of a section of the frame 10 is provided adjacent its pivotal connections with a split lug 13 in which is pivoted a lever 14 having a thumb space at one end and a toothed portion 15 at the other end. A toothed segment 16 is carried by the arm of the adjacent section of the frame, the toothed portion being concentrically disposed with relation to the pivotal connection to the two sections and is adapted to move in the path of the tooth end 15 of the lever 14 so that the latter when engaged with the segment in any desired relative position of the two sections, the entire frame will remain fixed. The thumb end of the lever is provided with a spring arrangement 17 which urges the toothed end 15 towards and into engagement with the segment 16.

Under ordinary constructions the means for supporting the hook like retractors 18, which retain the side wall of the abdomen, are actually the pivot pins of the frame joints, but in the present invention it has proven more satisfactory to mount the retractors on separate screw pins 19 which are carried by the sections adjacent their pivotal ends. The retractors 18 just referred to are those illustrated at opposite ends of the minor axis of the frame arrangement shown in Figures 1, 4 and 9 and comprise interchangeable curved blades having lateral lugs 20 with openings to receive the screw pins 19.

In addition to the retractors 18, similar arrangements are provided for the other portions or ends of the frame 10 defined by the major axis thereof. For this purpose a screw pin 21 is carried by one of the meeting sections adjacent the pivotal connection 12 and upon the screw pin 21 may be mounted any one of the various types of deep or small retractors. Generally such retractors comprise substantially J-shaped steel members 22 having a rigid or flexible blade and laterally slotted handle or stem, the purpose of the slot being to accommodate screw pin 21 over which a wing nut 23 is tightened against the handle portion to fix the retractor in proper position.

There are instances in certain abdominal procedures which require wide abdomino-pelvic exposure and still extreme care must be exercised to prevent harmful exposure of and contact with internal organs. Such an instance is illustratively exemplified in Figure 1 of the drawings, in which the blades 18 are applied to retract the side walls over gauze, the urinary bladder is retracted by the retractor blade 22, and the intestinal tract under gauze being retracted by a fourth retractor member 24.

The retractor 24, as illustrated in Figures 6 to 8 is a so-called deep retractor, that is to say its blades are designed to project to a substantial depth into the incision in the function of retracting the organs. In the embodiment illustrated, 25 comprises a straight handle or arm having a longitudinal slot 26 running throughout its length and terminating adjacent the outer end in an enlarged opening 27 which allows the arm to be placed in position over a screw pin 19 and wing nut 23 without removing the latter. The extreme outer end of the arm 25 is curved to form a hook 28 to allow easy adjustment by engaging the same by a finger to move the retractor laterally. The opposite end of the arm 25 is mounted in a cross head 29, which is a bar disposed at an angle to the plane of the arm, and which is provided on its under side with a fixed closed blade 30. The blade 30 is of a width substantially the length of the cross bar 29 and projects downwardly therefrom along the center of the bar. The under side of the bar 29 is also provided with two L-shaped slots or guide ways 31, the longer arm of each being parallel to and spaced inwardly of the under side of the bar while the shorter arms open out of the under side on opposite sides of the center blade 30. Two adjustable blades 32 and 33 are slidably mounted in the cross head 29, each comprising a closed member of the approximate size and shape of the fixed blade 30 and having a row of ribs 34' to facilitate movement of the blade arranged along the positions underlying a lateral flange 34 at its upper end to slidably fit the longer arm of a guide slot 31. The flange 34 in each instance is cut out at its free edge to form stops 35 which engage a stop pin 36 disposed in the side wall of the cross head 29 and projected into the longer arm of the slot 31. The stop pins 36 for the two slots 31 are disposed adjacent opposite ends of the cross head to permit adjustment of the blades 32 and 33 in opposite directions and to expose their maximum widths beyond that of the fixed blade 30. The blades 30, 32 and 33 are really nested one against the other, i. e. the adjustable blades 32 and 33 rest against opposite sides of the fixed blade and these blades at their lower free ends curve inwardly to a slight degree in the direction of the arm 25.

It will be appreciated that in performing operations upon the human body and the pelvic and abdominal regions in particular, it may become necessary to provide further adjustment in the positioning of the retractors to enable them to function at various angles. Therefore, in accordance with the present invention I provide almost universal adjustment of such retractors through the medium of specially constructed clamps 37, which may be applied to any section of the frame 10, and which are movable along the latter to any desired location.

The improved clamp, is illustrated in detail in Figures 4 and 5, and comprises a bracket having the form of a cube 38 which is provided with a lug 38' projecting from one of the upright faces of the cube and comprising two spaced lateral arms forming a groove 39 to receive the section of the frame 10, which is embraced on three of its four sides by the walls of the groove. The clamp is adjustably held on the frame by means of a hinged plate 40 which comprises a substantially U-shaped member in which the arms 41 loosely embrace the upright sides of the cube adjacent the grooved side 38 and above the groove 39 where they are pivotally mounted upon pivot screws 42 carried by the cube. The closed portion of the plate 40 is slightly concave in a longitudinal direction of the groove 39 over which it is adjusted to close over the fourth side of the frame section 10. The arms 41 of the plate are each provided with a thumb piece or projection 43 for the purpose of swinging the plate 40 to open and closed positions. So far I have described a clamp which is capable of being slidably mounted on and removed from the frame sections, in such a manner as to allow ready adjustment of the holder for the retractor. I mentioned above and illustrate that the closed portion of the plate 40 is concave, a feature which allows the closed portion to be sprung almost flat as it is pressed against the inner or fourth side of the frame section when the plate is forced to full closed posi-

tion, see Figure 5, which also illustrates the free edge of the closed end 44 hooked over the corner of the lower arm of the lug 38. This clamping action holds the clamp 39 against accidental movement along the frame section 10.

The retractor is carried on the clamp 39 and the means for attaching it comprises a ball 45 having a radially projecting integral column 46 which is provided with external threads 47 at its free end and a lateral flange 48 at its midportion. The ball 45 is disposed in a socket or opening 49 in the body of the cube 38, the socket being circular and having its axis coinciding with the vertical axis of the cube. The opening 50 for the socket out of the upper or top side of the cube is restricted to a size slightly smaller in diameter than that of the ball 45 so that the column 46 may project through the opening 50 and move universally therein. The socket 49 projects through the cube 38 and opens out of the bottom thereof where it is threaded to receive a screw plug 51. The ball 45 may be locked in any of its possible angular positions by means of a rod 52 disposed diametrically of the socket opening 49 and adapted to support a clutch plate or disc 52' axially movable in the opening and having a concave upper surface 52^2 contacting the under side of the ball, the rod 52 being supported in bearings in the opposite sides of the cube. The midportion of the rod 52 upon which the ball 45 rests is cut away to form a cam or depression 53 so that the ball resting upon the same will be loosely held and capable of adjustment in the socket. To fix the ball in position the rod is rotated to bring the uncut curved side 54 against the under surface of the disc 52^2 which lifts the ball and clamps the same against the wall of the restricted opening 50. A lever arm 55 is fixed on the outer end of the rod 52 to facilitate turning same to effect the locking or releasing of the ball.

The retractor is attached to the ball joint by placing the slotted arm 25 over the column 46 and after proper adjustment of the retractor as to the depth and angle, a thumb screw 56 is tightened against the arm over the threaded portion of the column and the lever 55 depressed.

In the use of the instrument, for example in connection with pelvic or abdominal procedures, the patient is prepared in the usual manner for the operation, which proceeds, first by making the proper incision and then inserting the side blades 18. The frame is then spread so as to cause the blades 18 disposed against the opposite edges of the incision, to separate the edges and expose the organs the desired amount. The dog and ratchet connection 14—15 allows the frame to open and retains it in open position against pressure of the abdominal walls. The patient is thereafter placed in proper position, several gauze packs are arranged in the abdomen to exclude the viscera and one or both of the retractors 22 and 24 are arranged in position, i. e. the hook shaped end of blade 22 engages the pack provided for the purpose of retaining the urinary bladder while the deep retractor 24 is adjusted against the gauze packs over the intestines which are pressed first by hand to the point where proper exposure is obtained and then allowed to be retained by the blades 30, 32 and 33 as illustrated in Figure 1. The operator will determine the width of retractor necessary and cause the extension or collapse of the blades to proper size. If retraction is required at some point or points offset from the diametrically opposite sides of the frame, defined by the fixed pivots, the clamp 37 is used, the clamp being adjusted and fixed to the frame section 10, and the blade retractor 24 tilted and moved to properly replace the hand which is then withdrawn.

From the brief description of the application of the present invention it will be apparent that the latter is a device of very simple construction and easy adjustment and one which once properly adjusted will not slip.

Having described my invention and set forth the manner in which the same is used, what I claim and desire to secure by Letters Patent is:

1. A self retaining retractor of the character described, comprising an adjustable open frame consisting of pivotally connected sections of flat stock and a clamp applicable to any portion of said sections to support interchangeable retractor blades at any position and angle, said clamp comprising an upright body portion having laterally projecting spaced lips to embrace top and bottom sides of the frame section, a lever pivotally mounted on said body portion and provided with a clamping portion to move against the exposed side of the section and fix the clamp and section together, and a universally adjustable retractor support carried by said body portion.

2. A self retaining retractor, as claimed in claim 1, in which said adjustable retractor support comprises a ball loosely mounted in a socket in said body portion and provided with an upstanding threaded stem and wing nut to detachably carry and attach an interchangeable rectractor member, and an externally operated cam deposed transversely of the socket to hold the ball in locked position or to free it to move freely in the socket.

3. A self retaining retractor, as claimed in claim 1, in which said adjustable retractor support comprises a ball loosely mounted in a socket in said body portion and resting on said disc and provided with an upstanding threaded stem and wing nut to detachably carry and attach an interchangeable rectractor member, a concave disc axially movable in the socket and against said ball and an externally operated cam deposed transversely of the socket operating against said disc to force the ball in locked position or to free it to move freely in the socket, said socket being formed by a bore having a vertical axis and being restricted at its upper end to form a seat against which the ball is locked by the cam and threaded at its opposite end, and a screw plug at the threaded end to close the bore.

4. In a self retaining retractor of the character described, the combination with an open frame and an adjustable clamp member therefor, of a retractor instrument carried by said clamp, comprising a handle terminating in a cross head having a fixed depending blade and having guideways adjacent said blade, and a blade for each guideway which conform to the fixed blade and are adjustable in their guideways to rest against the fixed blade or be extended to increase the effective width thereof.

5. In a self retaining retractor, as claimed in claim 4, in which the guideways in the cross-head comprise L-shaped slots having their lateral arms projecting in opposite directions on opposite sides of the fixed blade, and the other arms opening out of the bottom of the cross-head, and the upper ends of the adjustable blades being flanged to ride in said L-shaped slots.

6. In a self retaining retractor, as claimed in claim 4, in which the guideways in the cross-head comprises L-shaped slots having their

lateral arms projecting in opposite directions on opposite sides of the fixed blade, and the other arms opening out of the bottom of the cross-head, and the upper ends of the adjustable blades being flanged to ride in said L-shaped slots, said flanges having cutout portions to provide stops at opposite ends, and means arranged in each slot short of the outer ends thereof to be engaged by the stops to limit movement of the adjustable blades with respect to the fixed blade.

7. An extensible retractor instrument of the character described, comprising a hoe like member having a handle portion and an integral cross-head at one end provided with adjacent parallel guideways in its under side, a fixed-curved retractor blade depending from the cross-head intermediate said guideways, adjustable blades with flanges at their upper ends to fit said guideways and of forms to nest against said fixed blade at opposite sides thereof, and means to

limit adjustment of the movable blades relative of the fixed blade.

8. An extensible retractor instrument as claimed in claim 7, in which the movable blades are provided with ribs on their exposed surfaces to allow thumb grip whereby adjustment may be facilitated.

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