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DIAGNOSTIC PRESSURE APPLICATION INSTRUMENT

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Fig. 1.

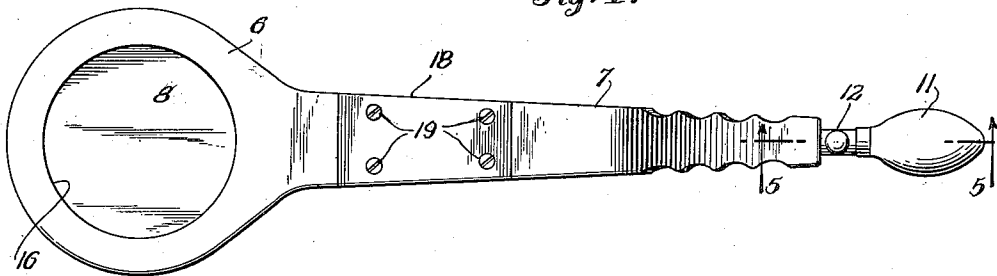


Fig. 2.

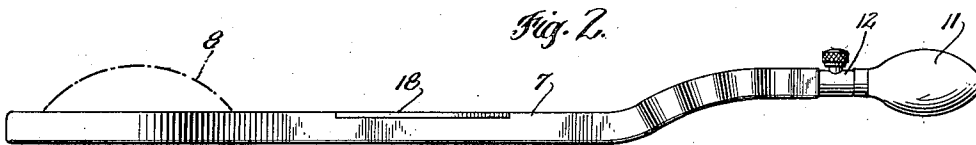


Fig. 3.

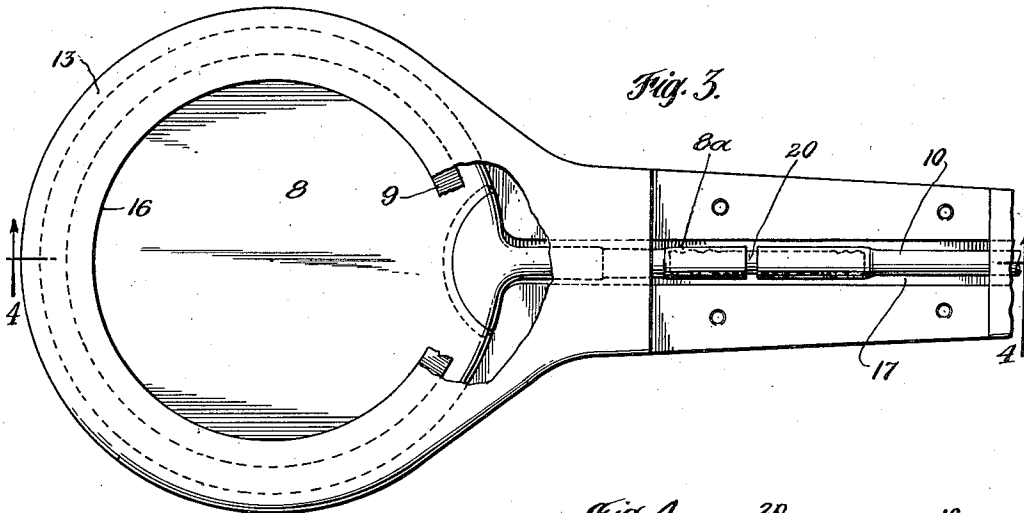


Fig. 4.

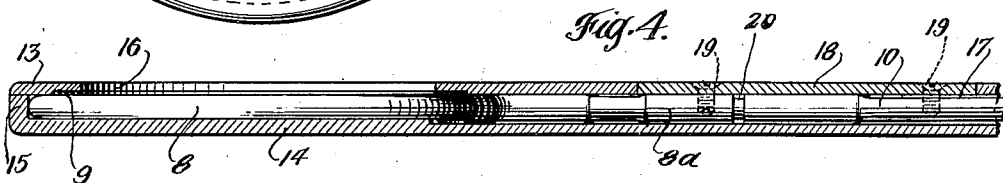
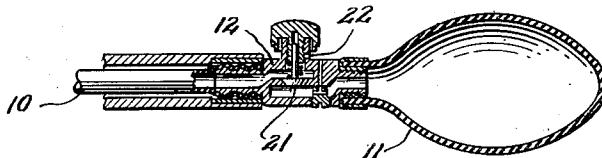


Fig. 5.



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DIAGNOSTIC PRESSURE APPLICATION INSTRUMENT

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9 Claims. (Cl. 250—50)

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This invention relates to an improved device for use in fluoroscopic or X-ray photographic examination of the body and particularly to an instrument to be used by physicians, roentgenologists, radiologists and technicians for the application of pressure to the body tissues during fluoroscopic examination and X-ray photography.

In fluoroscopic and X-ray examination of the body and particularly in examination of the gastro-intestinal tract, it is desirable that the physician be able to apply a localized pressure to the abdomen to displace organs and tissues which may overlie and obscure the particular part of the gastro-intestinal tract which, in the opinion of the physician, is the site of the pathology.

It is the primary object of my invention to provide an improved instrument which can be manipulated by the physician to apply such local pressure to any particular part of the abdomen.

It is a further object of my invention to provide an instrument which can be moved from place to place beneath the patient when in a prone position, which can be positioned in the desired location readily by fluoroscopic examination and by means of which varying degrees of pressure may be brought to bear on the body of the patient under examination.

Another object of my invention is to provide a pressure application instrument which can be easily sterilized without damage to any of the parts.

It is a further object of my invention to provide an instrument of the character described which can be manipulated by the physician without danger of exposure of the hands of the operator to the X-rays by means of which the examination and photographs are made.

I have illustrated my device in the preferred form of the accompanying drawings wherein:

Figure 1 is a plan view of the instrument;

Figure 2 is a side elevation of the instrument showing the distensible member thereof in inflated position in dot and dash line;

Figure 3 is an enlarged view with certain parts partially broken away.

Figure 4 is a section taken on the line 4—4 of Figure 3; and

Figure 5 is a section taken on the line 5—5 of Figure 1.

The principal parts of the instrument are the housing 6, handle 7, distensible member 8, X-ray opaque ring 9, tube 10, flexible bulb 11 and valve 12.

The most practical way to use the device is

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to place the patient to be examined in a prone or belly-down position on the X-ray table with the housing 6 of the device between the patient and the table, near the area to be examined, with the open face of the housing upward. In the following description it will be assumed that the instrument is being used in that manner.

The housing 6 in the particular embodiment illustrated is made of a material having good tensile strength and of low atomic weight, to reduce or eliminate opacity to X-rays. I have found that methyl methacrylate, which may be purchased under the trade name "Plexiglas" is an excellent material for the purpose. Other suitable materials will occur to those skilled in the art.

The handle 7 of the instrument may be integral with the housing, as illustrated or it may be a separate member. In either case it should be long enough to permit the operator to move the housing about beneath the patient without exposing his hands to X-ray bombardment. The end of the handle to be grasped by the operator is advantageously curved upwardly from the general plane of the instrument, (as shown in Figure 2) in order to permit the operator, who may be wearing thick lead-rubber gloves, to hold the bottom of the housing flat on the table when moving it about under the patient.

The housing 6 proper may be circular, as illustrated, and has a flat upper face 13, and a lower face plate 14 having an upstanding flange 15 around the edge which engages the upper plate 13 and spaces it from the lower plate. The upper plate 13 has a central circular opening 16 of smaller diameter than the inside diameter of the flanged portion of the lower plate 14 thus providing an overhang and forming an annular groove or chamber within and around the housing at the edge thereof.

A ring member 9 is embedded in the plate 6 adjacent the edge of the opening 16. This ring is made of lead or some other material which is relatively opaque to X-rays and when the instrument is in use under observation by fluoroscope the circular outline of the opening 16 will be indicated by the ring and the housing can be moved about beneath the patient until the opening 16 is in the desired position. It will be understood that the ring 9 can be embedded in the lower plate 14 if desired, so long as it is located to indicate the position of opening 16.

It should also be pointed out that while the housing is advantageously made of a material which is translucent to X-rays, it could be made

of an X-ray opaque material provided the lower face is translucent to X-rays below the opening in the upper face.

The handle 7 is provided with a passage 17 which extends from the end of the handle to the housing and opens into the annular chamber between the upper and lower face plates. If desired, removable plate member 18 may be secured to the upper face of the handle by means of screws 19 and when this plate is removed the passage 17 in the handle is accessible.

In the form of device shown in the drawings the distensible member is a flat circular airtight rubber bladder 8. The diameter of the bladder when uninflated should be slightly less than the inside diameter of the ring formed by the flange 15 and considerably greater than the diameter of the opening 16. Thus when the bladder is inserted in the housing the outside edge thereof will lie under the overhanging portion of the upper plate 13 and when the bladder is inflated this overhanging portion of plate 13 will engage the edge of the bladder and hold it in the housing.

The bladder 8 has a tubular extension 8a extending into the passage 17, the end of the tubular extension lying under the removable plate 18. The end of the tubular extension 8a is connected to a nipple 20 made of glass, metal or some other hard material. The rubber tube 19 is connected to the other end of the nipple and extends in the passage 17 to the end of the handle when it is connected to one side of a check valve 12, mounted in the end of the handle. The other side of the check valve is connected to the flexible bulb 11. By the construction just described it will be seen that the bladder 8 may be easily removed from the instrument by removing the plate 18 and disconnecting the tubular extension from the nipple. The bladder can then be pulled through the opening in the housing. Conversely it is equally easy to insert a new bladder in the instrument when needed. In case the handle is not provided with a removable plate, the tubular extension 8a of the bladder would extend to the end of the handle.

The check valve is of a usual type and when the knurled head is screwed down squeezing of the bulb 11 will force air through the passages to lift the spring held valve 21 off its seat to permit the air to flow to the bladder. When the bulb is released the spring will force the valve to its seat to prevent the air from flowing from the bladder. When the knurled head is unscrewed, the port 22 is uncovered thus permitting the air to escape from the bladder.

From a practical point of view I believe the use of an airtight rubber bladder as the distensible member is preferable but it is pointed out that it would be possible to use a single sheet of rubber mounted below the opening in the upper face in airtight connection to the housing with an airtight passage in the handle leading to the under side of the sheet.

The instrument is preferably used in the following manner: The patient is placed in prone position on the X-ray table with housing, opening up, between the patient and the table and near the part of the abdomen in which the pathology is suspected. The fluoroscopic examination is then begun and the physician guides the instrument to the part of the abdomen wherein he, by training, seeks pathology. When the opaque ring is observed to be in proper location to surround the suspected area, pressure is then

applied to the body by pumping air into the bladder to distend it through the opening in the housing and as the pressure is applied the overlying tissue and body parts, some of which may be barium sulphate filled will be compressed or pushed aside until the physician is able to clearly visualize the particular site in which he is interested. The degree of distention of the bladder can be regulated by pumping air into or releasing air from the bladder until best visibility of the affected site is secured and the exposure of the X-ray film is then made.

The housing is so designed as to give it ample surface bearing on the X-ray table. The flat underface gives good frictional engagement with the table and prevents accidental slipping. The material being a non-abrasive plastic prevents scratching of the surface of the X-ray table which is common when metallic instruments are used on the table top. The handle is sufficiently long to enable the physician to move the housing about readily without exposing his hands to X-ray bombardment and the curved and grooved handle grip is high enough to allow the operator to grasp the handle easily even when his hands are encased in heavy-lead-rubber gloves.

A particular advantage of the use of the removable rubber bladder in the instrument is that the bladder, tubes and associated parts can be taken out and washed in an antiseptic or otherwise sterilized if the instrument should be soiled in use. The housing and handle likewise can more readily be sterilized when the bladder, tubes, etc. are removed.

I claim:

1. A pressure application device for diagnostic examination of the body comprising a substantially flat housing member having an opening in a face thereof, the other face of said housing being transparent to X-rays at least in the area opposite said opening, a handle member attached to the housing whereby the housing may be moved by the operator with relation to the body under examination without exposure of the hands of the operator to the X-rays, a distensible member extending across said opening, a fluid passage associated with said handle leading into said housing and means to supply fluid under pressure to said passage whereby said distensible member may be distended through the opening in the housing by the fluid pressure to apply pressure to the part of the body adjacent the opening.

2. A device according to claim 1 wherein the housing has an X-ray opaque section outlining the opening in the housing.

3. A device according to claim 1 wherein the distensible member consists of an air-tight bladder connected to the fluid supply passage associated with the handle.

4. A pressure application device for diagnostic examination of the body comprising a substantially flat housing member transparent to X-rays and having an opening in a face thereof, a handle member attached to the housing whereby the housing may be moved by the operator with relation to the body under examination without exposure of the handle of the operator to the X-rays, a distensible member extending across said opening, a fluid passage associated with said handle leading into said housing and means to supply fluid under pressure to said passage whereby said distensible member may be distended through the opening in the housing by the

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fluid pressure to apply pressure to the part of the body adjacent the opening.

5. A device according to claim 4 wherein the housing has an X-ray opaque section outlining the opening in the housing.

6. A device according to claim 4 wherein the distensible member consists of an air-tight bladder connected to the fluid supply passage associated with the handle.

7. A pressure application device for diagnostic examination of the body comprising a substantially flat housing member transparent to X-rays and having an opening in a face thereof, a distensible bladder lying beneath and extending across said opening, a handle member attached to the housing whereby the housing may be moved by the operator in relation to the body under examination without exposure of the hands of the operator to the X-rays, a passage in said handle leading into the housing, a tube in said passage connected at one end to the bladder and a flexible bulb associated with the tube to pump air therethrough into the bladder whereby said bladder may be distended through the opening in the housing to apply pressure to the part of the body lying above the opening.

8. A pressure application device for diagnostic examination of the body comprising a substantially flat housing member transparent to X-rays and having an opening in a face thereof, a distensible bladder lying beneath and extending across said opening, a handle member attached to the housing whereby the housing may be moved by the operator in relation to the body under ex-

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amination without exposure of the hands of the operator to the X-rays, a passage in said handle leading into the housing, a tube in said passage connected at one end to the bladder, a flexible bulb associated with the tube to pump air therethrough into the bladder whereby said bladder may be distended through the opening in the housing to apply pressure to the part of the body lying above the opening, and a check valve associated with said tube to prevent escape of air from the bladder.

9. A pressure application device for diagnostic examination of the body comprising a substantially flat circular housing member transparent to X-rays having upper and lower face plates with an opening in one of said plates, a substantially circular removable distensible bladder lying between said plates, the diameter of the bladder, when uninflated, being greater than the diameter of said opening, a handle member attached to the housing whereby the housing may be moved by the operator in relation to the body under examination without exposure of the hands of the operator to the X-rays, a passage associated with said handle leading into the housing, a tube in said passage connected at one end to the bladder and means associated with the tube to force air therethrough into the bladder whereby said bladder may be distended through the opening in the housing to apply pressure to the part of the body lying above the opening.

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No references cited.