

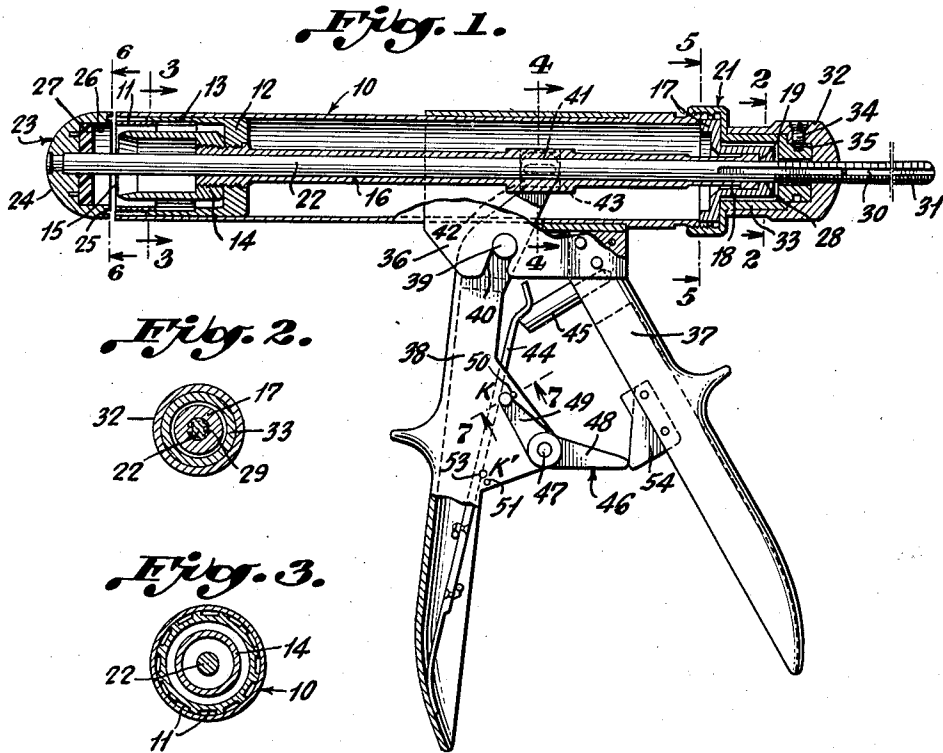
July 6, 1965

M. G. AKHALAYA ETAL

3,193,165

INSTRUMENT FOR SUTURING ESOPHAGUS TO INTESTINE OR STOMACH

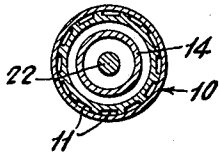
Filed Aug. 27, 1962



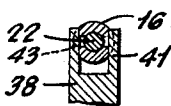
*Fig. 2.*



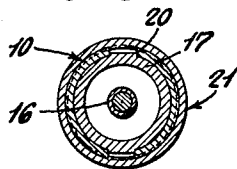
*Fig. 3.*



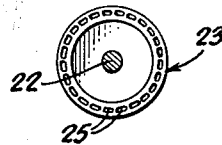
*Fig. 4.*



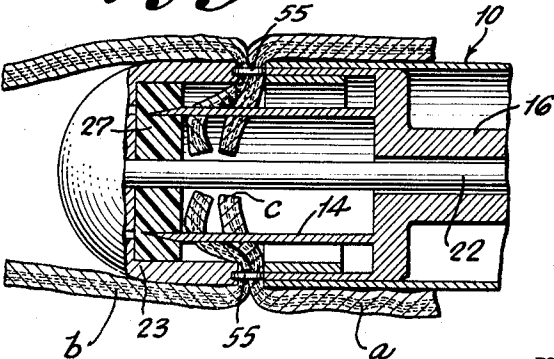
*Fig. 5.*



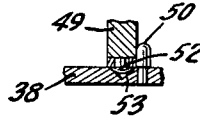
*Fig. 6.*



*Fig. 8.*



*Fig. 7.*



INVENTOR  
MIKHAIL G. AKHALAYA

BY *Shasenkov, Downing & Seabold*  
ATTORNEYS

1

2

3,193,165

**INSTRUMENT FOR SUTURING ESOPHAGUS  
TO INTESTINE OR STOMACH**

Mikhail Gueorguievich Akhalaya, Sukhumi, ulitsa Lenina 22, Apt. 7; Viacheslav Sergeevich Kasoolin, Bolshaya Pochtovaya ulitsa 18/20, korpus 1, Apt. 47; Gueorgui Vasilievich Astafiev, the 2nd Novo-Ostankinskaya ul. 8a, Apt. 33; Svetoslav Ivanovich Babkin, the 1st Chere-mushkinskaya ulitsa 11/9, korpus 1, Apt. 16; Alexander Nesterovich Burtsev, Donetsk oblasti, ulitsa Art-jema 84, Apt. 16; Tatyana Vladimirovna Kalinina, Chasovaya ulitsa 27/12, Apt. 22; and Gueorgui Iosifovich Tatishvili, Tbilisi, Didubiiskaya ulitsa 4; all of Moscow, U.S.S.R.

Filed Aug. 27, 1962, Ser. No. 222,987

10 Claims. (Cl. 227—8)

This invention relates to surgical instruments and more particularly to such an instrument for suturing the esophagus to the intestine or stomach by utilizing metallic staples to provide a circular suture.

At present when it is necessary to attach the end of the esophagus to the lateral wall of the intestine or to the stomach, it is customary to perform this operation manually by the use of a needle and suturing thread. Such an operation requires from twenty to twenty-four stitches and, therefore, the quality of the suture depends primarily on the skill of the surgeon.

Suturing devices have previously been proposed for facilitating this operation, but these have not proved satisfactory, in that undesirable complications, such as necrosis etc., have resulted and furthermore, these devices only facilitate the formation of a linear suture and cannot be utilized for forming a circular suture, such as is necessary in attaching the end of the esophagus to the intestinal wall or to the wall of the stomach.

It is accordingly an object of the invention to provide a surgical instrument for suturing the end of the esophagus to the wall of the intestine or to the wall of the stomach by the use of a circular series of metal staples.

A further object of the invention is the provision of a surgical instrument for suturing the end of the esophagus to the wall of the intestine or to the wall of the stomach, which instrument may be conveniently manipulated by one hand of the user to place a circular series of staples and clinch the same to provide a circular suture.

A still further object of the invention is the provision of a surgical instrument for suturing the end of the esophagus to the wall of the intestine or the wall of the stomach, which instrument may be conveniently manipulated to clamp the tissues of the two organs in juxtaposition and thereafter insert and clinch a circular row of staples to provide a circular suture and also to cut away excess tissue within the circular row of staples.

Another object of the invention is the provision of a surgical instrument for suturing the end of the esophagus to the wall of the intestine or to the wall of the stomach, which instrument is provided with means for preventing inadvertent operation thereof.

A further object of the invention is the provision of a surgical instrument for suturing the esophagus to the wall of the intestine or the wall of the stomach, which instrument may be conveniently inserted and withdrawn through a single incision in the wall of the intestine or the wall of the stomach.

A still further object of the invention is the provision of a surgical instrument for suturing the esophagus to the wall of the intestine or to the wall of the stomach, which instrument may be conveniently disassembled for cleaning purposes or for replacement of parts, such instrument also being suitable for sterilization.

Further objects and advantages of the invention will be

apparent from the following description taken in conjunction with the accompanying drawing wherein:

FIG. 1 is a side elevational view with parts broken away and in section for greater clarity and showing the overall construction of the surgical instrument of this invention;

FIG. 2 is a sectional view taken substantially on the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken substantially on the line 3—3 of FIG. 1;

FIG. 4 is a fragmentary sectional view taken substantially on the line 4—4 of FIG. 1;

FIG. 5 is a sectional view taken substantially on the line 5—5 of FIG. 1;

FIG. 6 is a sectional view taken substantially on the line 6—6 of FIG. 1;

FIG. 7 is a fragmentary sectional view taken substantially on the line 7—7 of FIG. 1; and

FIG. 8 is a fragmentary sectional view to an enlarged scale and showing the manner of using the instrument of this invention to suture the end of the esophagus to a wall of the intestine or stomach and the manner in which excess tissues are cut away after completion of the suturing operation.

With continued reference to the drawing, there is shown a surgical instrument constructed in accordance with this invention and which may well comprise an elongated tubular body 10 which is provided at the forward end with a circular series of pockets 11 which are open at opposite ends and each of which pockets serve to receive a staple with the prongs of such staple projecting toward the forward end of the body 10. Slidably mounted within the body 10 is a member 12 which is provided at the forward end thereof with a circular series of staple ejecter fingers 13 and such fingers 13 enter the pockets 11 from the rear and are slidably received therein. A knife 14 is mounted on the member 12 and a circular cutting edge 15 is provided on the forward end of the knife 14.

A tubular push rod 16 is fixed to the member 12 and the push rod 16 extends rearwardly within the body 10. A washer 17 engages the rear end of the body 10 and the washer 17 is provided with a recess 18 for slidably receiving the rear end of the push rod 16. The recess 18 terminates in a shoulder 19 which serves to engage the rear end of the push rod 16 and limit rearward movement thereof. The washer 17 and rear end of the body 10 are provided with interlocking means 20 for orienting the washer 17 with respect to the body 10. A clamping nut 21 is threadedly received on the rear end of the body 10 and, as clearly shown in FIG. 1, the nut 21 engages the washer 17 to removably secure the same in place on the rear end of the body 10.

An adjusting rod 22 extends through and is slidably received in the push rod 16 and secured to the forward end of the adjusting rod 22 is a pilot head 23 having a generally hemispherical forward end surface 24. The pilot head 23 is provided on the rear side thereof with a circular series of recesses 25, as clearly shown in FIG. 6, and such recesses are disposed in alignment with the pockets 11 in the body 10 and the recesses 25 serve to provide anvils for clinching staples ejected from the pockets 11 in a manner to be later described. The pilot head 23 is also provided with a rearwardly opening annular recess 26 which serves to removably receive a pad 27 which may well comprise a disk of semi-hard plastic material or other suitable material and such pad 27 provides an abutment for engagement with the cutting edge 15 of the knife 14 thereby serving to prevent damage or undue dulling of such cutting edge.

The adjusting rod 22 extends rearwardly through an aperture 28 in the washer 17 and such aperture 28 may be non-circular in form or may be provided with keys

29 as shown in FIG. 2 which are slidably received in splines or grooves 30 in the adjusting rod 22 and which serve to prevent relative rotation between the rod 22 and the washer 17.

The rear end of the adjusting rod 22 is threaded, as at 31, and such threads are threadedly engaged by an adjusting nut 32 which is rotatably mounted on a cylindrical portion 33 of the clamping nut 21. A set screw 34 received in the adjusting nut 32 and having a portion engaging a groove 35 in the clamping nut 21 serves to removably retain the adjusting nut 32 on the clamping nut 21 while permitting relative rotation therebetween to adjust the adjusting rod 22 longitudinally for a purpose which will presently appear.

A bracket 36 is secured to the body 10 and fixed to the bracket 36 and projecting laterally from the body 10 is a fixed handle 37. A movable handle 38 is provided with a pivot pin 39 which is removably received in slots 40 in the brackets 36 and serves to pivotally and removably mount the movable handle 38 on the bracket 36. The movable handle 38 is also provided with a forked end 41 which is received between spaced abutments 42 and 43 on the push rod 16 whereby movement of the movable handle 38 results in moving the push rod 16 longitudinally. A suitable spring 44 is provided on the movable handle 38 and the spring 44 engages a projection 45 on the fixed handle 37 to urge the movable handle 38 away from the fixed handle 37.

In order to prevent inadvertent operation of the movable handle 38, there may be provided a lever 46 pivotally mounted at 47 on the movable handle 38 and the lever 46 is provided with a nose portion 48 and a finger engaging portion 49. The finger engaging portion 49 is movable from one position K in engagement with a stop member 50 to a second position K' in engagement with a second stop member 51. As shown in FIG. 7, the finger engaging lever 49 may be provided with a detent 52 for engaging in recesses 53 in the movable handle 38 to releasably retain the finger engaging portion 49 in either the position K or the position K'. With the finger engaging portion 49 in the position K as shown in FIG. 1, the nose portion 48 engages a projection 54 on the fixed handle 37 and prevents movement of the movable handle 38 toward the fixed handle 37. However, upon movement of the finger engaging portion 49 to the position K', the nose portion 48 will be moved away from the projection 54 and thereby permit movement of the movable handle 38 toward the fixed handle 37 to operate the instrument.

In order to utilize the instrument of this invention for suturing the end of the esophagus to a wall of the intestine or wall of the stomach, the instrument is assembled in the condition shown in FIG. 1 and it will be noted that by reason of the interlocking means 20 between the washer 17 and the body 10 and further, by reason of the engagement of the keys 29 and splines 30 that adjusting rod 22 and pilot head 23 carried thereby will be oriented with respect to the body 10 such that the anvil recesses 25 in the pilot head 23 will be disposed in alignment with the staple receiving pockets 11 of the body 10 and it is further to be assumed that staples have been positioned in each pocket 11 and that the entire instrument has been suitably sterilized. While the inter-engaging means between the washer 17 and adjusting rod 22 has been shown and described as a splined connection, obviously any non-circular formation of the aperture in the washer 17 and a complementary formation of the engaging surface of the adjusting rod 22 will provide the desired results.

With particular reference to FIG. 8, it will be seen that the pilot head 23 and the forward end of the body 10 has been introduced into the intestine or stomach through a suitable incision in the wall *a* thereof and the wall *a* has previously been punctured at a point *c* where it is desired to attach the end of the esophagus. Prior to insert-

ing the instrument into the intestine or stomach, the adjusting nut 32 is adjusted to space the pilot head 23 from the forward end of the body 10 and after moving the pilot head 23 through the aperture *c* in the wall *a* of the intestine or stomach, the end of the wall *b* of the esophagus is pulled together between the rear side of the pilot head 23 and the forward end of the body 10 by a suitable preliminary suture in the nature of a drawstring which is not illustrated in the drawing, but which serves to dispose the end of the wall *b* of the esophagus in the position shown in FIG. 8 with such end disposed within the rearwardly opening recess 26 in the pilot head 23. The adjusting nut 32 is now operated to move the pilot head 23 toward the forward end of the body 10 which serves to clamp the tissues of the wall *a* of the intestine or stomach and the wall *b* of the esophagus together as clearly shown in FIG. 8. At this time the finger engaging portion 49 of the lever 46 is moved to the position K' and the movable handle 38 is moved toward the fixed handle 37 which results in forward movement of the push rod 16 and consequent forward movement of the member 12 which results in the fingers 13 ejecting staples from the pockets 11 and the staples 55 are forced through the wall *a* of the intestine or stomach and the wall *b* of the esophagus and are clinched in position by engaging in the anvil recesses 25 in the rear side of the pilot head 23. At the same time, the knife 14 moves forwardly and the circular edge 15 thereof moves to the position shown in FIG. 8 to cut the excess tissues inwardly of the row of staples 55 to permit removal of such excess tissues and also to provide an opening through which the pilot head of the instrument is removed after manipulation of the adjusting nut 32 to relieve the clamping pressure between the rear side of the pilot head 23 and the forward end of the body 10.

It will thus be seen that there has been provided by the above described surgical instrument a device which may be conveniently utilized to provide a circular suture between the end of the esophagus and the wall of the intestine or the wall of the stomach, the suturing being completed in a single rapid operation and obviously, such operation does not require the high degree of skill which is necessary in manually suturing the esophagus to the wall of the intestine or the wall of the stomach.

Suitable safeguards have been provided to prevent inadvertent operation of the instrument and to provide for suitable and foolproof operation thereof and the instrument of this invention serves to materially simplify what heretofore has been an extremely difficult and dangerous operation.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawing and described in the specification, but only as indicated in the appended claims.

What we claim is:

1. A surgical instrument for suturing the esophagus to the intestine or stomach, said instrument comprising an elongated tubular body, the forward end of said body having a circular series of pockets open at opposite ends for receiving a staple in each pocket, a member slidably received in said body, staple ejecter fingers on said member, said fingers entering said pockets from the rear, a knife mounted on said member and having a circular cutting edge at the forward end, a tubular push rod fixed to said member and extending rearwardly within said body, a washer engaging the rear end of said body and having a recess slidably receiving the rear end of said push rod, a shoulder in said recess to limit rearward movement of said push rod, interlocking means on said body and washer to prevent relative rotation therebetween, a clamping nut threadedly received on the rear end of said body and engaging said washer to removably retain said washer in place, an adjusting rod extending through said push rod, a pilot head fixed to the forward end of said adjusting rod,

5

said head having a circular series of recesses in alignment with said pockets and providing anvils for clinching staples ejected from said pockets, said head having an angular recess opening rearwardly, a removable pad in said annular recess for engaging the cutting edge of said knife, a non-circular aperture in said washer, said adjusting rod extending through said aperture and having a complementary non-circular portion engaging the wall of said recess to permit sliding movement of said adjusting rod and orient said head, a cylindrical portion on said nut, an adjusting nut rotatably received on said cylindrical portion and threadedly engaging said adjusting rod to adjust the axial position of said head with respect to said body, a fixed handle extending laterally from said body, spaced abutments on said push rod, a movable handle pivotally mounted on said body and a forked end on said movable handle received between said abutments, whereby upon operation of said movable handle said push rod will move said fingers forwardly to eject staples from said pockets and clinch the same and will move said cutting edge into engagement with said pad.

2. A surgical instrument as defined in claim 1 in which stop means is provided for preventing inadvertent movement of said movable handle.

3. A surgical instrument as defined in claim 2 in which said stop means comprises a lever pivotally mounted on said movable handle and movable between two positions, a nose portion on said lever for engaging said fixed handle in one position to prevent movement of said movable handle and in the other position to permit such movement and detent means for releasably retaining said lever in either position.

4. A surgical instrument as defined in claim 1 in which spring means is provided for returning said movable handle to original position.

5. A surgical instrument as defined in claim 1 in which said movable handle is removable to permit disassembly of said instrument.

6. A surgical instrument as defined in claim 1 in which means is provided for rotatably and removably retaining said adjusting nut on the cylindrical portion of said clamping nut.

7. A surgical instrument as defined in claim 1 in which said pad comprises a semi-hard plastic disk.

8. A surgical instrument as defined in claim 1 in which the forward end of said pilot head is substantially hemispherical.

6

9. A surgical instrument as defined in claim 1 in which said knife is removable to permit replacement.

10. A surgical instrument for suturing the esophagus to the intestine or stomach, said instrument comprising an elongated tubular body, the forward end of said body having a circular series of pockets open at opposite ends for receiving a staple in each pocket, a member slidably received in said body, staple ejecter fingers on said member, said fingers entering said pockets from the rear, a knife mounted on said member and having a circular cutting edge at the forward end, a tubular push rod fixed to said member and extending rearwardly within said body, a washer engaging the rear end of said body, means on said washer to limit rearward movement of said push rod, interlocking means on said body and washer to prevent relative rotation therebetween, a clamping nut threadedly received on the rear end of said body and engaging said washer to removably retain said washer in place, an adjusting rod extending through said push rod, a pilot head fixed to the forward end of said adjusting rod, said head having a circular series of recesses in alignment with said pockets and providing anvils for clinching staples ejected from said pockets, said head having an annular recess opening rearwardly, a removable pad in said annular recess for engaging the cutting edge of said knife, a non-circular aperture in said washer, said adjusting rod extending through said aperture and having a complementary non-circular portion engaging the wall of said recess to permit sliding movement of said adjusting rod and orient said head, a cylindrical portion on said nut, an adjusting nut rotatably received on said cylindrical portion and threadedly engaging said adjusting rod to adjust the axial position of said head with respect to said body, a fixed handle extending laterally from said body, spaced abutments on said push rod, a movable handle pivotally mounted on said body and a forked end on said movable handle received between said abutments, whereby upon operation of said movable handle said push rod will move said fingers forwardly to eject staples from said pockets and clinch the same and will move said cutting edge into engagement with said pad.

No references cited.

45 GRANVILLE Y. CUSTER, JR., *Primary Examiner*.