

Analyzing Functional Language: EXAMPLE 1: ULTRASONIC SURGICAL SHEARS

The invention is an ultrasonic surgical shears. A specification excerpt follows:

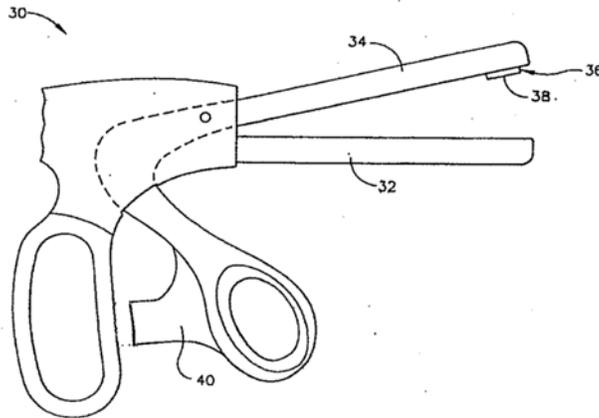


FIG. 3 (modified)

Applicant invented ultrasonic surgical shears 30 for cutting and sealing blood vessels during surgery. During use, a blood vessel is positioned between the surgical blade 32 and the tissue pad 36 on the clamping arm 34. The shears are then closed to apply a clamping force at the clamping surface area 38, defined as the area where the blade 32 and the pad 36 are in close proximity when the clamping arm 34 is in a closed position. The blade 32 vibrates at a high frequency to transect (cut) and seal the vessel. A force limiting mechanism 40 functions to limit the user applied clamping force on tissue disposed between the tissue pad 36 and the blade 32 to a range of 60 psi and 210 psi at the clamping surface area 38. The force limiting mechanism 40 is described as a force limiter coupled to the clamping arm 34, which in one embodiment is designed in the same manner as conventional force limiting mechanisms widely utilized in surgical staplers and throughout the surgical instrument field with the force limiter abutting a portion of the blade handle to limit the user applied clamping force. The pressure range in accordance with this invention results in blood vessel sealing at lower transection times and higher burst pressures (resistance to bursting).

The following set of hypothetical claims shows variations on the use of functional language.

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What is claimed is:

1. An ultrasonic surgical shears comprising:
 - a) an ultrasonic surgical blade;
 - b) a clamping arm coupled to the blade and operable to open and close toward the blade; and
 - c) a tissue pad attached to the clamping arm, the blade and tissue pad defining a clamping surface area,wherein an applied clamping force is limited to a range of 60 psi to 210 psi at the clamping surface area.

2. An ultrasonic surgical shears comprising:
 - a) an ultrasonic surgical blade;
 - b) a clamping arm coupled to the blade and operable to open and close toward the blade; and
 - c) a tissue pad attached to the clamping arm, the blade and tissue pad defining a clamping surface area,wherein the shears apply a clamping force to permit cutting and sealing a blood vessel at the clamping surface area.

3. An ultrasonic surgical shears for cutting and sealing a blood vessel during surgery, comprising:
 - a) an ultrasonic surgical blade;
 - b) a clamping arm coupled to the blade and operable to open and close toward the blade; and
 - c) a tissue pad attached to the clamping arm, the blade and tissue pad defining a clamping surface area.

4. An ultrasonic surgical shears comprising:
 - a) an ultrasonic surgical blade;
 - b) a clamping arm coupled to the blade and operable to open and close toward the blade;
 - c) a tissue pad attached to the clamping arm, the blade and tissue pad defining a clamping surface area; and
 - d) a force limiter coupled to the clamping arm, wherein the force limiter engages the blade to limit an applied clamping force to a range of 60 psi to 210 psi at the clamping surface area.

5. An ultrasonic surgical shears comprising:
 - a) an ultrasonic surgical blade;
 - b) a clamping arm coupled to the blade and operable to open and close toward the blade;
 - c) a tissue pad attached to the clamping arm, the blade and tissue pad defining a clamping surface area; and
 - d) a force limiting mechanism for limiting an applied clamping force to a range of 60 psi to 210 psi at the clamping surface area.