WHAT IS CLAIMED IS:

1. A surgical stapling device, comprising;

a first jaw;

a second jaw having an open position and a closed position with respect to the first jaw;

an actuating bar arranged in the first jaw and including a first set of ratchet teeth;

a ratchet piston configured to oscillatingly displace the actuating bar along a longitudinal direction of the first jaw;

a housing; having at least one staple and at least one staple driving slot, situated in the first jaw; and

a carriage, including at least one staple-driving wedge, selectively engageable with the first set of ratchet teeth of the actuating bar to translate the carriage in a distal direction through the housing from a proximal terminal position to a distal terminal position, a distance between the distal terminal position and the proximal terminal position greater than a stroke length of the oscillating displacement of the ratchet bar;

wherein the staple driving wedge is adapted to drive the staple through the staple driving slot against the second jaw during distal movement of the carriage through the housing.

2. The surgical stapling device of claim 1,

wherein the actuating bar includes a second set of ratchet teeth; and

wherein the carriage is further selectively engageable with the second set of ratchet teeth to translate the carriage in a proximal direction through the housing from the distal terminal position to the proximal terminal position.

3. The surgical stapling device of claim 1, wherein the ratchet piston is hydraulically actuated.

4. The surgical stapling device of claim 1, further comprising a bidirectional latching mechanism adapted to engage with the first set of ratchet teeth to translate the carriage in the distal direction and to engage with the second set of ratchet teeth to translate the carriage in the proximal direction.

5. The surgical stapling device of claim 4, wherein the bidirectional latching mechanism is engaged with the carriage via a spring force transfer pin, and the bidirectional latching mechanism is spring-loaded about the spring force transfer pin.

6. The surgical stapling device of claim 5, wherein the actuating bar includes an enlarged opening at a distal end, the enlarged opening sized to allow the spring-loaded bidirectional latching mechanism to rotate about the spring force transfer pin to disengage with the first set of ratchet teeth and engage with the second set of ratchet teeth.

7. The surgical stapling device of claim 1, wherein the ratchet piston includes a ratchet piston shaft having a circumferential recess situated at a distal end of the ratchet piston shaft, the actuating bar having a force transfer rib situated at a proximal end of the actuating bar, the force transfer rib configured to fit into the circumferential recess, the ratchet piston shaft configured to transfer force to the ratchet via the circumferential recess and the force transfer rib, to oscillate the actuating bar.

8. The surgical stapling device of claim 1, wherein the ratchet piston is a double-action piston.

9. The surgical stapling device of claim 1, wherein the second jaw is moveable from the open position to the closed position by a clamping force exerted on the second jaw by the carriage.

10. The surgical stapling device of claim 1, wherein the carriage includes a first set of carriage teeth and a second set of carriage teeth, the carriage engageable with the actuating bar via one of (i) the first set of carriage teeth being engaged with the first set of ratchet teeth to translate the carriage in the distal direction through the housing and (ii) the second set of carriage teeth being engaged with the second set of ratchet teeth to translate the carriage in the proximal direction through the housing.

11. The surgical stapling device of claim 1, wherein the ratchet piston includes a ratchet piston shaft and a force transfer pin situated at a distal end of the ratchet piston shaft, the actuating bar having a force transfer slot situated at a proximal end of the actuating bar, the force transfer pin adapted to fit into the force transfer slot, the ratchet piston shaft adapted

to transfer force to the actuating bar via the force transfer pin and the force transfer slot, to oscillate the actuating bar.

12. The surgical stapling device of claim 1, further comprising:

an anvil pivot pin situated in a first anvil pin slot of the first jaw and a second anvil pin slot of the second jaw; and

an anvil piston configured to drive the anvil pivot pin in the distal direction to exert a clamping force in the second jaw to move the second jaw from the open position to the closed position, and to drive the anvil pivot pin in the proximal direction to release the clamping for in the second jaw to move the second jaw from the closed position to the open position.

13. The surgical stapling device of claim 1, further comprising:

a piston housing to house the ratchet piston; and

a head release latch adapted to releasably engage the piston housing with the first jaw;

wherein the ratchet piston is engaged with the actuating bar when the piston housing is engaged with the first jaw.

14. The surgical stapling device of claim 1, further comprising:

a base unit having a hydraulic pump;

a flexible shaft in hydraulic communication with the base unit and the ratchet piston;

wherein a hydraulic force generated by the hydraulic pump is transferrable from the base unit to the ratchet piston.

15. The surgical stapling device of claim 14,

wherein the base unit includes at least two single-action pistons; one of the at least two single-action pistons being in fluid communication with a distal side of the ratchet piston, and one of the at least two single-action pistons being in fluid communication with a proximal side of the ratchet piston; and

wherein each of the at least two single-action pistons exacts positive or negative hydraulic pressure on the distal or the proximal side of the ratchet piston.

16. The surgical stapling device of claim 14, further comprising:

a control device, including a switch, situated between the base unit and the ratchet piston;

wherein the switch is operable to selectively initiate transfer of hydraulic force from the base unit to the ratchet piston, and to selectively terminate transfer of hydraulic force from the base unit to the ratchet piston.

17. A method for surgically stapling, comprising:

clamping a second jaw into a closed position with respect to a first jaw from an open position with respect to the first jaw;

oscillatingly driving a ratchet piston;

oscillating an actuating bar situated in the first jaw by the driving of the ratchet piston, the actuating bar oscillating a stroke length along a longitudinal direction of the first jaw, the actuating bar having a first set of ratchet teeth;

ratcheting a carriage in a distal direction from a proximal terminal position to a distal terminal position through a housing situated in the first jaw by the oscillating of the actuating bar, the housing having at least one staple and at least one staple driving slot, by ratcheting engagement with the first set of teeth; and

driving the at least one staple through the at least one staple driving slot by the ratcheting of the carriage in the distal direction;

wherein a distance between the distal terminal position and the proximal terminal position is greater than the stroke length.

What is claimed is:

1. A surgical stapling device, comprising;

a first jaw;

a second jaw having an open position and a closed position with respect to the first jaw;

an actuating bar arranged in the first jaw and including a first set of ratchet teeth;

a ratchet piston configured to oscillatingly displace the actuating bar along a longitudinal direction of the first jaw;

a housing; having at least one staple and at least one staple driving slot, situated in the first jaw; and

a carriage, including at least one staple-driving wedge, selectively engageable with the first set of ratchet teeth of the actuating bar to translate the carriage in a distal direction through the housing from a proximal terminal position to a distal terminal position, a distance between the distal terminal position and the proximal terminal position greater than a stroke length of the oscillating displacement of the ratchet bar;

wherein the staple driving wedge is adapted to drive the staple through the staple driving slot against the second jaw during distal movement of the carriage through the housing.

2. The surgical stapling device of claim 1,

wherein the actuating bar includes a second set of ratchet teeth; and

wherein the carriage is further selectively engageable with the second set of ratchet teeth to translate the carriage in a proximal direction through the housing from the distal terminal position to the proximal terminal position.

3. The surgical stapling device of claim 1, wherein the ratchet piston is hydraulically actuated.

4. The surgical stapling device of claim 1, further comprising a bidirectional latching mechanism adapted to engage with the first set of ratchet teeth to translate the carriage in the distal direction and to engage with the second set of ratchet teeth to translate the carriage in the proximal direction.

5. The surgical stapling device of claim 4, wherein the bidirectional latching mechanism is engaged with the carriage via a spring force transfer pin, and the bidirectional latching mechanism is spring-loaded about the spring force transfer pin.

6. The surgical stapling device of claim 5, wherein the actuating bar includes an enlarged opening at a distal end, the enlarged opening sized to allow the spring-loaded bidirectional latching mechanism to rotate about the spring force transfer pin to disengage with the first set of ratchet teeth and engage with the second set of ratchet teeth.

7. The surgical stapling device of claim 1, wherein the ratchet piston includes a ratchet piston shaft having a circumferential recess situated at a distal end of the ratchet piston shaft, the actuating bar having a force transfer rib situated at a proximal end of the actuating bar, the force transfer rib configured to fit into the circumferential recess, the ratchet piston shaft configured to transfer force to the ratchet via the circumferential recess and the force transfer rib, to oscillate the actuating bar.

8. The surgical stapling device of claim 1, wherein the ratchet piston is a double-action piston.

9. The surgical stapling device of claim 1, wherein the second jaw is moveable from the open position to the closed position by a clamping force exerted on the second jaw by the carriage.

10. The surgical stapling device of claim 1, wherein the carriage includes a first set of carriage teeth and a second set of carriage teeth, the carriage engageable with the actuating bar via one of (i) the first set of carriage teeth being engaged with the first set of ratchet teeth to translate the carriage in the distal direction through the housing and (ii) the second set of carriage teeth being engaged with the second set of ratchet teeth to translate the carriage in the proximal direction through the housing.

11. The surgical stapling device of claim 1, wherein the ratchet piston includes a ratchet piston shaft and a force transfer pin situated at a distal end of the ratchet piston shaft, the actuating bar having a force transfer slot situated at a proximal end of the actuating bar, the force transfer pin adapted to fit into the force transfer slot, the ratchet piston shaft adapted to transfer force to the actuating bar via the force transfer pin and the force transfer slot, to oscillate the actuating bar.

12. The surgical stapling device of claim 1, further comprising:

an anvil pivot pin situated in a first anvil pin slot of the first jaw and a second anvil pin slot of the second jaw; and

an anvil piston configured to drive the anvil pivot pin in the distal direction to exert a clamping force in the second jaw to move the second jaw from the open position to the closed position, and to drive the anvil pivot pin in the proximal direction to release the clamping for in the second jaw to move the second jaw from the closed position to the open position.

13. The surgical stapling device of claim 1, further comprising:

a piston housing to house the ratchet piston; and

a head release latch adapted to releasably engage the piston housing with the first jaw;

wherein the ratchet piston is engaged with the actuating bar when the piston housing is engaged with the first jaw.

14. The surgical stapling device of claim 1, further comprising:

a base unit having a hydraulic pump;

a flexible shaft in hydraulic communication with the base unit and the ratchet piston;

wherein a hydraulic force generated by the hydraulic pump is transferable from the base unit to the ratchet piston.

15. The surgical stapling device of claim 14,

wherein the base unit includes at least two single-action pistons; one of the at least two single-action pistons being in fluid communication with a distal side of the ratchet piston, and one of the at least two single-action pistons being in fluid communication with a proximal side of the ratchet piston; and

wherein each of the at least two single-action pistons exacts positive or negative hydraulic pressure on the distal or the proximal side of the ratchet piston.

16. The surgical stapling device of claim 14, further comprising:

a control device, including a switch, situated between the base unit and the ratchet piston;

wherein the switch is operable to selectively initiate transfer of hydraulic force from the base unit to the ratchet piston, and to selectively terminate transfer of hydraulic force from the base unit to the ratchet piston.

17. A method for surgically stapling, comprising:

clamping a second jaw into a closed position with respect to a first jaw from an open position with respect to the first jaw;

oscillatingly driving a ratchet piston;

oscillating an actuating bar situated in the first jaw by the driving of the ratchet piston, the actuating bar oscillating a stroke length along a longitudinal direction of the first jaw, the actuating bar having a first set of ratchet teeth;

ratcheting a carriage in a distal direction from a proximal terminal position to a distal terminal position through a housing situated in the first jaw by the oscillating of the actuating bar, the housing having at least one staple and at least one staple driving slot, by ratcheting engagement with the first set of teeth; and

driving the at least one staple through the at least one staple driving slot by the ratcheting of the carriage in the distal direction;

wherein a distance between the distal terminal position and the proximal terminal position is greater than the stroke length.