

WHAT IS CLAIMED IS:

1. A pair of shear blades to be provided in a ram blowout preventer for cutting a tubular, the pair of shear blades comprising:

a first blade having cutting edges provided substantially in a same plane; and

a second blade having cutting edges provided in two planes substantially parallel so that the cutting edges of the first blade fit between the cutting edges of the second blade,

wherein the first blade has a projection portion configured to fit into a cavity of the second blade.

2. The pair of shear blades of Claim 1, wherein the projection portion of the first blade and the cavity of the second blade are in a central region of the blades.

3. The pair of shear blades of Claim 1, wherein the first blade has a front surface configured to cut the tubular in concert with a front surface of the second blade.

4. The pair of shear blades of Claim 3, wherein the front surface of the first blade comprises:

an upper part having a first cutting surface and a second cutting surface; and

a lower part having a first mirror cutting surface and a second mirror cutting surface,

wherein the first cutting surface and the first mirror cutting surface intersect each other at a first cutting edge, and

the second cutting surface and the second mirror cutting surface intersect each other at a second cutting edge.

5. The pair of shear blades of Claim 4, wherein the projection portion further comprises:

an upper part having a first projection cutting surface and a second projection cutting surface; and

a lower part having a first projection mirror cutting surface and a second projection mirror cutting surface,

wherein the first projection cutting surface and the first projection mirror cutting surface intersect each other at a first cutting edge, and

the second projection cutting surface and the second projection mirror cutting surface intersect each other at a second cutting edge.

6. The pair of shear blades of Claim 5, wherein the first cutting surface intersects with the first projection cutting surface, the second cutting surface intersects with the second projection cutting surface, the first mirror cutting surface intersects with the first

projection mirror cutting surface, and the second mirror cutting surface intersects with the second projection mirror cutting surface.

7. The pair of shear blades of Claim 3, wherein the front face of the second blade comprises:

a first cutting surface;

a second cutting surface that intersects with the first cutting surface to form a first cutting edge;

a third cutting surface that intersects with the second cutting surface; and

a fourth cutting surface that intersects with the third cutting surface to form a second cutting edge,

wherein the second cutting surface forms a V-shape with the third cutting surface.

8. The pair of shear blades of Claim 7, wherein the first to fourth cutting surfaces form a W-shape and the cavity is formed in a central apex of the W-shape.

9. The pair of shear blades of Claim 8, wherein the first and second cutting edges are substantially parallel to each other.

10. A shear ram blowout preventer (BOP), comprising:

a body having a first elongated cavity extending along a first axis and a second elongated cavity extending perpendicular to and intersecting the first elongated cavity;

a pair of ram blocks provided in the first elongated cavity and configured to slide along the first axis, wherein the ram blocks have frontal faces facing each other and the frontal faces are configured to slide towards the second elongated cavity; and

a pair of shear blades configured to be attached to the ram blocks and also configured to shear a tubular provided in the second elongated cavity when the ram blocks slide towards the tool,

wherein the pair of shear blades comprises:

a first blade having cutting edges provided substantially in a same plane; and

a second blade having cutting edges provided in two planes substantially parallel so that the cutting edges of the first blade fit between the cutting edges of the second blade,

wherein the first blade has a projection portion configured to fit into a cavity of the second blade.

11. The shear ram BOP of Claim 10, wherein the projection portion of the first blade and the cavity of the second blade are in a central region of the blades.

12. The shear ram BOP of Claim 10, wherein the first blade has a front surface configured to cut the tubular in concert with a front surface of the second blade.

13. The shear ram BOP of Claim 12, wherein the front surface of the first blade comprises:

an upper part having a first cutting surface and a second cutting surface; and
a lower part having a first mirror cutting surface and a second mirror cutting surface,

wherein the first cutting surface and the first mirror cutting surface intersect each other at a first cutting edge, and

the second cutting surface and the second mirror cutting surface intersect each other at a second cutting edge.

14. The shear ram BOP of Claim 13, wherein the projection portion further comprises:

an upper part having a first projection cutting surface and a second projection cutting surface; and

a lower part having a first projection mirror cutting surface and a second projection mirror cutting surface,

wherein the first projection cutting surface and the first projection mirror cutting surface intersect each other at a first cutting edge, and

the second projection cutting surface and the second projection mirror cutting surface intersect each other at a second cutting edge.

15. The shear ram BOP of Claim 14, wherein the first cutting surface intersects with the first projection cutting surface, the second cutting surface intersects with the second projection cutting surface, the first mirror cutting surface intersects with the first projection mirror cutting surface, and the second mirror cutting surface intersects with the second projection mirror cutting surface.

16. The shear ram BOP of Claim 12, wherein the front face of the second blade comprises:

a first cutting surface;

a second cutting surface that intersects with the first cutting surface to form a first cutting edge;

a third cutting surface that intersects with the second cutting surface; and

a fourth cutting surface that intersects with the third cutting surface to form a second cutting edge,

wherein the second cutting surface forms a V-shape with the third cutting surface.

17. The shear ram BOP of Claim 16, wherein the first to fourth cutting surfaces form a W-shape and the cavity is formed in a central apex of the W-shape.

18. The shear ram BOP of Claim 17, wherein the first and second cutting edges are substantially parallel to each other.

19. A method for manufacturing shear blades for cutting a tubular inside a blowout preventer, the method comprising:

forming a first blade having a front cutting face having a first geometry, the first geometry promoting a secure positioning of the tubular relative to the first blade;

forming a second blade having a front cutting face having a second geometry different from the first geometry, the second geometry promoting a puncturing of the tubular prior to cutting;

forming cutting edges on the front cutting faces of the first and second blades;
and

installing the first and second blades in a same blowout preventer,

wherein the cutting edges of the first and second blades are configured to cut the tubular when actuated.

20. The method of Claim 19, further comprising:

forming a projection portion in the first blade; and

forming a cavity in the second blade, the cavity being configured to receive the projection portion.

What is claimed is:

1. A pair of shear blades to be provided in a ram blowout preventer for cutting a tubular, the pair of shear blades comprising:

a first blade having first blade cutting edges provided substantially in a same horizontal plane and extending horizontally across the first blade;

a second blade having upper and lower second blade cutting edges provided in two horizontal planes substantially parallel with each other and extending horizontally across the second blade, and a horizontally extending recess between the upper and lower second blade cutting edges, the recess having a length at least equal to a total length of the first blade cutting edges, so that the first blade cutting edges fit into the recess between the upper and lower second blade cutting edges when the blades are moved toward a shearing position; and wherein

the first blade has a projection portion protruding past the first blade cutting edges and configured to fit into the recess of the second blade.

2. The pair of shear blades of claim 1, further comprising a cavity within a central portion of the recess of greater depth than remaining portions of the recess, the cavity receiving the projection portion of the first blade when the blades are in the shearing position.

3. The pair of shear blades of claim 1, wherein the first blade comprises an upper surface extending upward and rearward from the first blade cutting edges, a lower surface extending downward and rearward from the first blade cutting edges, the upper and lower surfaces extending the total length of the first blade cutting edges and being mirror images with each other.

4. The pair of shear blades of claim 1, wherein the first blade comprises:
an upper cutting surface extending upward from the first blade cutting edges, and a lower cutting surface extending downward from the first blade cutting surfaces; wherein the upper and lower cutting surfaces extend the total length of the first blade cutting edges.

5. The pair of shear blades of claim 1, wherein the first blade cutting edges extend across the projection portion, defining an upper part extending upward from the first blade cutting edges and a lower part extending downward from the first blade cutting edges.

6. The pair of shear blades of claim 5, wherein the projection portion has a configuration of a four-sided pyramid.

7. The pair of shear blades of claim 1, wherein the upper and lower second blade cutting edges have a V-shape with a central portion rearward of outer ends of the cutting edges.

8. The pair of shear blades of claim 1, wherein the second blade has a top surface and a bottom surface joined by opposite sides, and the upper and lower second blade cutting edges extend from one of the sides to the other.

9. The pair of shear blades of claim 1, wherein the upper second blade cutting edges are located directly above the lower second blade cutting edges.

10. A shear ram blowout preventer (BOP), comprising:
a body having a first elongated cavity extending along a horizontal axis and a second elongated cavity extending perpendicular to and intersecting the first elongated cavity;

a pair of ram blocks provided in the first elongated cavity and configured to slide along the horizontal axis, wherein the ram blocks have frontal faces facing each other and the frontal faces are configured to slide towards the second elongated cavity;

a pair of shear blades configured to be attached to the ram blocks and also configured to shear a tubular provided in the second elongated cavity when the ram blocks slide towards the tool, wherein the pair of shear blades comprises:

a first blade having first blade cutting edges provided substantially in a same horizontal plane and extending horizontally across the first blade; and

a second blade having upper and lower second blade cutting edges provided in upper and lower horizontal planes and extending horizontally across the second blade, and a horizontally extending recess between the upper and lower second blade cutting edges having a length at least equal to a total length of the first blade cutting edges so that the first blade cutting edges fit in the recess between the upper and lower second blade cutting edges when the first and second blades are moved to a shearing position, wherein the first blade has a projection portion configured to fit into a cavity within the recess of the second blade, the cavity having a greater depth than the recess.

11. The shear ram BOP of claim 10, wherein the projection portion of the first blade and the cavity of the second blade are in a central region of the blades.
12. The shear ram BOP of claim 10, wherein:
the first blade cutting edges comprise two lateral cutting edges that join the projection portion and diverge rearwardly from the projection portion; and
the recess has two lateral portions that join the cavity and diverge forwardly from the cavity.
13. The shear ram BOP of claim 10, wherein the first blade comprises:
an upper part extending upward and slanting rearward from the first blade cutting edge; and
a lower part extending downward and slanting rearward from the first blade cutting edges; and
the upper and lower parts being mirror images of each other.
14. The shear ram BOP of claim 10, wherein the first blade cutting edges extend across the projection portion, defining an upper part of the projection portion and a lower part of the projection portion, the upper and lower parts of the projection portion being mirror images of each other.
15. The shear ram BOP of claim 14, wherein the projection portion has a configuration of a four-sided pyramid.
16. The shear ram BOP of claim 10, wherein the second blade has a top surface and a bottom surface joined by opposite sides, and the upper and lower second blade cutting edges extend from one of the sides to the other.
17. The shear ram BOP of claim 16, wherein the upper second blade cutting edges are located directly above the lower second blade cutting edges.
18. The shear ram BOP of claim 17, wherein the upper and lower second blade cutting edges are substantially identical to each other.
19. A shear ram blowout preventer (BOP), comprising:
a body having a first elongated cavity extending along a horizontal axis and a second elongated cavity extending perpendicular to and intersecting the first elongated cavity;

a pair of ram blocks provided in the first elongated cavity and configured to slide along the horizontal axis, wherein the ram blocks have frontal faces facing each other and the frontal faces are configured to slide towards the second elongated cavity;

a pair of shear blades configured to be attached to the ram blocks and also configured to shear a tubular provided in the second elongated cavity when the ram blocks slide towards the tool, wherein the pair of shear blades comprises:

a first blade having a front face;

a first blade cutting edge extending in a horizontal plane across and protruding from the front face of the first blade;

a second blade having a front face;

an upper second blade cutting edge extending in a horizontal plane and protruding from the front face of the second blade, the horizontal plane containing the upper second blade cutting edge being above the horizontal plane containing the first blade cutting edge;

a lower second blade cutting edge extending in a horizontal plane and protruding from the front face of the second blade, the horizontal plane containing the lower second blade cutting edge being lower than the horizontal plane containing the first blade cutting edge;

a recess in the front face of the second blade between the upper and lower second blade cutting edges having a length at least equal to a length of the first blade cutting edge, the upper and lower second blade cutting edges protruding past the recess; and wherein

the first blade cutting edge fits in the recess between the upper and lower second blade cutting edges when the first and second blades are moved to a shearing position.

20. The shear ram BOP of claim 19, wherein the first blade cutting edge and the recess have mating V-shapes.