CLAIMS

1. A system, comprising:

a reciprocating compressor frame, comprising:

a central housing having a central axis;

a first crosshead guide extending outwardly from the central housing, wherein the first crosshead guide is configured to support reciprocating movement of a first crosshead along a first axis;

a first support extending along a first support plane between the first crosshead guide and the central housing; and

a second support extending along a second support plane between the first crosshead guide and the central housing, wherein the first and second planes of the first and second supports are oriented in a first converging relationship, and the first and second supports are tapered from the central housing to the first crosshead guide.

2. The system of claim 1, comprising:

a second crosshead guide extending outwardly from the central housing, wherein the second crosshead guide is configured to support reciprocating movement of a second crosshead along a second axis;

a third support extending along a third support plane between the second crosshead guide and the central housing; and

a fourth support extending along a fourth support plane between the second crosshead guide and the central housing, wherein the third and fourth planes of the third and fourth supports are oriented in a second converging relationship, and the third and fourth supports are tapered from the central housing to the second crosshead guide.

3. The system of claim 2, wherein the first and second crosshead guides extend outwardly from opposite sides of the central housing.

4. The system of claim 3, wherein the first and second axes are aligned with one another.

5. The system of claim 1, wherein the first and second planes of the first and second supports generally converge toward the first axis.

6. The system of claim 5, wherein the first and second supports extend along opposite first and second side portions of the first crosshead guide.

7. The system of claim 6, wherein the first and second supports extend along the central housing directly to a base.

8. The system of claim 1, comprising a reciprocating compressor having the reciprocating compressor frame and the first crosshead disposed in the first crosshead guide.

9. The system of claim 8, comprising a drive coupled to the reciprocating compressor.

10. The system of claim 1, comprising first and second structural ribs extending lengthwise along the first crosshead guide to the central housing, wherein the first and second structural ribs are disposed on an opposite side of the first crosshead guide relative to the first and second supports.

11. The system of claim 1, wherein the first and second crosshead guides, the first and second supports, and the central body are formed integrally as a single piece.

12. A system, comprising:

a reciprocating machine frame, comprising:

a central housing having a central axis;

a first crosshead guide extending outwardly from the central housing, wherein the first crosshead guide is configured to support reciprocating movement of a first crosshead along a first axis;

a first support extending along a first support plane between the first crosshead guide and the central housing;

a second support extending along a second support plane between the first crosshead guide and the central housing, wherein the first and second planes of the first and second supports are oriented in a first converging relationship;

a second crosshead guide extending outwardly from the central housing, wherein the second crosshead guide is configured to support reciprocating movement of a second crosshead along a second axis;

a third support extending along a third support plane between the second crosshead guide and the central housing; ~~and~~

a fourth support extending along a fourth support plane between the second crosshead guide and the central housing, wherein the third and fourth planes of the third and fourth supports are oriented in a second converging relationship; and

a common support rib extending longitudinally along the first crosshead guide, across the central housing, and longitudinally along the second crosshead guide.

13. The system of claim 12, wherein the first and second crosshead guides extend outwardly from opposite sides of the central housing.

14. The system of claim 13, wherein the first and second axes are aligned with one another.

15. The system of claim 12, wherein the first and second planes of the first and second supports generally converge toward the first axis, and the third and fourth planes of the third and fourth supports generally converge toward the second axis.

16. The system of claim 15, wherein the first and second supports extend along opposite first and second side portions of the first crosshead guide, and the third and fourth supports extend along opposite third and fourth side portions of the second crosshead guide.

17. The system of claim 16, wherein the first and second supports extend along the central housing directly to a base, and the third and fourth supports extend along the central housing directly to the base.

18. The system of claim 12, comprising a reciprocating machine having the reciprocating machine frame, the first crosshead disposed in the first crosshead guide, and the second crosshead disposed in the second crosshead guide.

19. The system of claim 18, wherein the reciprocating machine comprises a reciprocating compressor.

20. A method, comprising:

supporting, via a first pair of converging supports, a first crosshead guide extending outwardly from a central housing of a reciprocating compressor frame, wherein the first crosshead guide is configured to support reciprocating movement of a first crosshead, wherein the first pair of converging supports extend along first and second planes that converge directly from a base of the reciprocating compressor frame ~~portion~~, along the central housing, to opposite first and second side portions of the first crosshead guide; and

supporting, via a second pair of converging supports, a second crosshead guide extending outwardly from the central housing of the reciprocating compressor frame, wherein the second crosshead guide is configured to support reciprocating movement of a second crosshead, wherein the second pair of converging supports extend along third and fourth planes that converge directly from the base of the reciprocating compressor frame ~~portion~~, along the central housing, to opposite third and fourth side portions of the second crosshead guide.

21. The system of claim 12, comprising a first support rib extending longitudinally along the first crosshead guide at a first offset from the common support rib, and a second support rib extending longitudinally along the second crosshead guide at a second offset from the common support rib, wherein the first support rib is disposed on a first side of

the common support rib and the second support rib is disposed on a second side of the common support rib opposite from the first side.

22. The system of claim 12, wherein the first and second supports are tapered from the central housing to the first crosshead guide, and the third and fourth supports are tapered from the central housing to the second crosshead guide.

23. The method of claim 20, wherein each of the first pair of converging supports is tapered from the central housing to the first crosshead guide, and each of the second pair of converging supports is tapered from the central housing to the second crosshead guide.

CLAIMS

1. A reciprocating compressor comprising:

a frame including:

a hollow central body defining an interior volume and including a base;

first and second crosshead guides extending from opposite sides of the central body, each of the first and second crosshead guides including a first end portion coupled to the central body and a second end portion configured to be coupled to a compression cylinder; and

at least one support structure extending from the second end portion of each of the first and second crosshead guides to the first end portion and the central body, wherein the at least one support structure comprises an oblique support structure formed at an angle with respect to first and second dimensions of the respective crosshead guide, the first and second dimensions perpendicular to one another within a first plane that is perpendicular to a longitudinal axis of the respective crosshead guide, to increase stiffness of the respective crosshead guide in both the first and second dimensions, wherein the first dimension is parallel to a second plane defined by the base

a crosshead disposed within each of the first and second crosshead guides

a crankshaft disposed within the interior volume and coupled to each crosshead via a connecting rod, wherein the crankshaft and each crosshead are configured such that rotation of the crankshaft during operation induces linear motion of each crosshead within the respective crosshead guide

wherein the first crosshead guide and its associated oblique support structure are opposed to and at least partially axially overlap the second crosshead guide and its associated oblique support structure along the hollow central body such that during operation the oblique support structures of the first and second crosshead guides reduce a coupled moment of the frame resulting from the induced linear motion of the crossheads within the respective first and second crosshead guides.

2. The reciprocating compressor of claim 1, wherein the central body comprises a generally cylindrical body.

3. The reciprocating compressor of claim 1, wherein each of the first and second crosshead guides and its respective at least one support structure are formed integrally with the central body.

4. The reciprocating compressor of claim 1, wherein the oblique support structure is formed at an angle substantially equal to forty-five degrees with respect to both the first and second dimensions of the respective crosshead guide to increase stiffness of the respective crosshead guide in substantially equal amounts in both the first and second dimensions.

5. The reciprocating compressor of claim 1, wherein the first and second crosshead guides are axially offset from one another along the central body.

6. The reciprocating compressor of claim 5, wherein the at least one support structure includes a longitudinal rib common to the first and second crosshead guides and the central body.

7. The reciprocating compressor of claim 5, wherein the at least one support structure comprises a support rib formed on a surface of the first or second crosshead guide and terminating at the central body.

8. The reciprocating compressor of claim 1, wherein the at least one support structure comprises a plurality of oblique support structures including at least a first pair of oblique support structures extending from the first crosshead guide and a second pair of oblique support structures extending from the second crosshead guide.

9. The reciprocating compressor of claim 8, wherein the two oblique support structures of the first pair of oblique support structures extend beyond opposite sides of the first crosshead guide.

10. The reciprocating compressor of claim 9, wherein each of the two oblique support structures of the first pair of oblique support structures are formed at a

substantially identical angle with respect to the second dimension of the first crosshead guide.

11. The reciprocating compressor of claim 1, wherein the at least one support structure includes a support rib formed orthogonally with respect to one of the first or second dimensions of the respective crosshead guide.

12. A reciprocating compressor frame comprising:

a central body having a base, an inner surface and an outer surface, wherein the inner surface defines an interior volume and is configured to receive an internal compressor component;

a pair of crosshead guides extending from opposite sides of the central body, each of the crosshead guides including a frame end coupled to the central body and a cylinder end configured to attach to a compression cylinder, each of the crosshead guides also having a height and a width corresponding to first and second dimensions orthogonal to each other and to a longitudinal axis of the respective crosshead guide, the second dimension parallel to a surface of the base, wherein each of the crosshead guides is configured to receive a crosshead and to facilitate reciprocating linear motion of the respective crossheads; and

a plurality of support structures extending from the cylinder ends of the pair of crosshead guides to the frame ends and the central body, wherein each of the support structures of the plurality of support structures is formed on one of the crosshead guides at a non-orthogonal angle with respect to a plane parallel to the longitudinal axis of the respective crosshead guide and orthogonal to the surface of the base to increase the rigidity of the crosshead guide in each of the first and second dimensions, and wherein one of the pair of crossheads guides and one or more support structures extending therefrom are opposed to and at least partially overlapping the other of the pair of crosshead guides and one or more support structures extending therefrom about the central body to reduce a coupled moment of the reciprocating compressor frame resulting from the reciprocating linear motion of the respective crossheads of the pair of crosshead guides.

13. The reciprocating compressor frame of claim 12, wherein the central body, the pair of crosshead guides, and the plurality of support structures are formed integrally with one another.

14. The reciprocating compressor frame of claim 12, wherein the central body comprises a generally cylindrical body.

15. The reciprocating compressor frame of claim 12, wherein at least one support structure of the plurality of support structures is formed on one of the crosshead guides at a non-orthogonal angle with respect to the plane parallel to the longitudinal axis of the respective crosshead guide substantially equal to forty-five degrees such that at least one support structure enhances the rigidity of the crosshead guide by a substantially equal magnitude in each of the first and second dimensions.

16. The reciprocating compressor frame of claim 12, wherein each of the support structures of the plurality of support structures is formed on one of the crosshead guides at substantially identical non-orthogonal angles with respect to the plane parallel to the longitudinal axis of the respective crosshead guide.

17. A reciprocating compressor system comprising:

a crankshaft;

a housing disposed about the crankshaft, the housing configured to facilitate rotation of the crankshaft during operation of the compressor system;

a driver coupled to the crankshaft and configured to drive rotation of the crankshaft during operation;

a plurality of crosshead guides comprising at least first and second crosshead guides extending from opposite sides of the housing, the first and second crosshead guides including housing end portions adjacent the housing;

a plurality of compression cylinders coupled to compression cylinder end portions of the plurality of crosshead guides opposite the housing end portions;

a plurality of crossheads disposed within the plurality of crosshead guides and coupled to the crankshaft such that rotation of the crankshaft during operation induces reciprocal linear motion of each crosshead within its respective crosshead guide, wherein each crosshead is coupled to a respective piston disposed within one of the compression cylinders and drives the respective piston to facilitate compression of a fluid within the compression cylinder; and

a plurality of angled support structures extending from the compression cylinder end portions of the crosshead guides to the housing end portions and the housing, wherein each angled support structure of the plurality of angled support structures is oriented at non-zero angles with respect to a first plane perpendicular to a rotational axis of the crankshaft within the housing and parallel to a longitudinal axis of the respective crosshead guide from which each angled support structure extends, and with respect to a horizontal second plane perpendicular to the vertical first plane, and wherein the first crosshead guide includes at least one angled support structure of the plurality of angled support structures, the second crosshead guide includes at least one angled support structure and the first and second crosshead guides and their respective at least one angled support structures at least partially axially overlap with respect to the rotational axis of the crankshaft such that the plurality of angled support structures reduce a coupled moment of the housing disposed about the crankshaft resulting from the reciprocal linear motion of the plurality of crossheads within the plurality of crosshead guides.

18. The reciprocating compressor system of claim 17, wherein the housing is substantially cylindrical.

19. The reciprocating compressor system of claim 17, wherein the plurality of angled support structures, the plurality of crosshead guides, and the housing are formed integrally with one another.