Claims

1. A packer (120) comprising:

a container (130) defining a cavity (136);

two tracks (240(1), 240(2)) disposed within the cavity (136);

two ball screws (170(1), 170(2)) respectively and rotatably disposed within the tracks (240(1), 240(2));

two ball nuts (180(1), 180(2)) respectively and operatively coupled around the ball screw (170(1), 170(2)), wherein rotation of the ball screw (170(1), 170(2)) causes the ball nut (180(1), 180(2)) to move along the ball screw (170(1), 170(2)) and the ball nut (180(1), 180(2)) includes a first end (182(1)) and a second end (184(1));

a packer blade (160) coupled to the ball nut (180(1), 180(2)) via a floating interface, and wherein movement of the ball nuts (180(1), 180(2)) along the ball screws (170(1), 170(2)) forces the packer blade (160) to move within the cavity (136) of the container (130), and the floating interface allows the packer blade (160) to float with respect to the ball nuts (180(1), 180(2));

two flange plates (370(1), 370(2)) respectively coupled to the second end (184(1)) of the ball nut (180(1), 180(2)), and

two transfer plates (230(1), 230(2)) coupled to a first sidewall (212) and a second sidewall (222) of the packer blade (160) proximate to a bottom end of the packer blade (160), each of the transfer plates (230(1), 230(2)) including an upper portion (310(1)), a lower portion (330(1)), and a contact plate (320(1)), wherein the upper portion (310(1)) is substantially cylindrical in shape and includes a first end (312(1)) and a second end (314(1)) opposite to the first end (312(1)) and the contact plate (320(1)) is disposed on the first end (312(1)) of the upper portion (310(1)),

wherein each of the ball screws (170(1), 170(2)) is disposed within a channel extending through the upper portion (310(1)),

wherein the floating interface is formed by a loose coupling of the flange plates (370(1), 370(2)) to the contact plates (320(1)) of the transfer plates (230(1), 230(2)), and

wherein each of the flange plates (370(1), 370(2)) includes an opening (378(1)), each of the contact plates (320(1)) includes an opening (324(1)) configured to be aligned with the

opening (378(1)) of each of the flange plates (370(1), 370(2)), and two bolts (380(1), 380(2)) inserted through the opening (324(1)) of each of the contact plates (320(1)) and coupled to the opening (378(1)) of the flange plates (370(1), 370(2)) to form the floating interface and allow the contact plates (320(1)) to float along the bolts (380(1), 380(2)) with respect to the flange plates (370(1), 370(2)).

2. The packer (120) according to claim 1, wherein each of the ball screws (170(1), 170(2)) includes a first end (172(1), 172(2)) and a second end (174(1), 174(2)).

3. The packer (120) according to claim 2, wherein rotation of the ball screws (170(1), 170(2)) in the first direction causes the ball nuts (180(1), 180(2)) to move along the ball screws (170(1), 170(2)) towards the second end (174(1), 174(2)) of the ball screws (170(1), 170(2)), and rotation of the ball screws (170(1), 170(2)) in the second direction causes the ball nuts (180(1), 180(2)) to move along the ball screws (170(1), 170(2)) toward the first end (172(1), 172(2)) of the ball screws (170(1), 170(2)).

4. The packer (120) according to claim 1, wherein the tracks (240(1), 240(2)) are each formed by an outer bracket (250(1)) and a debris cover (260(1)) within the cavity (136), wherein the outer bracket (250(1)) and the debris cover (260(1)) form a cavity (270(1), 270(2)) of each of the tracks (240(1), 240(2)), each of the flange plates (370(1), 370(2)) includes a flange (379(1)) extending beyond an outer circumference of the contact plate (320(1)) to contact a top portion and a bottom portion of the outer bracket (250(1)) and to act as a guide through the cavity (270(1), 270(2)) of each of the tracks (240(1), 240(2)) for the movement of the ball nuts (180(1), 180(2)), the flange plates (370(1), 370(2)), and the transfer plates (230(1), 230(2)) of the packer blade (160) through the tracks (240(1), 240(2)), the outer brackets (250(1)) are coupled to, or integrally formed on, an interior surface of the container.

5. The packer (120) according to claim 1, wherein each of the bolts (380(1), 380(2)) includes a head portion (382(1), 382(2)), an unthreaded shank portions (384(1), 384(2)), and a threaded portion (386(1));

each of the flange plates (370(1), 370(2)) further include lower openings (378(1));

each of the contact plates (320(1)) further include lower openings (324(1)) aligned

with the lower openings (378(1)) of the flange plates (370(1), 370(2));

the bolts (380(1), 380(2)) have a length such that, when inserted through the lower is openings 324(1) of the contact plate 320(1);

the threaded portion (386(1)) screws into the lower openings 378(1) of the flange plates (370(1), 370(2)), while the unthreaded shank portion (384(1), 384(2)) is disposed within the lower openings (324(1)) of the contact plates (320(1));

the contact plates (320(1)) are able to float along the unthreaded shank portions (384(1), 384(2)) between the head portions (382(1), 382(2)) and the threaded portions (386(1)).

6. The packer (120) according to claim 6, wherein the length of the bolts (380(1), 380(2)) enables the contact plates (320(1)) to float up to 1.27 centimeters in a direction toward the flange plates (370(1), 370(2)) or away from the flange plates (370(1), 370(2)).

7. The packer (120) according to claim 1, wherein the packer blade is sized such that a first side and a second side opposite to the first side of the packer blade are spaced from inner walls of an interior surface of the container by 1.27 centimeters.