# COMPRESSION APPARATUSES, SYSTEMS AND METHODS FOR SCREENING MATERIALS

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims the benefit of U.S. Provisional Patent Application Serial No. 63/464,982, filed May 9, 2023, the entire contents of which are hereby incorporated by reference and the priority of which is hereby claimed.

## FIELD

**[0002]** The present disclosure relates generally to material screening. More particularly, the present disclosure relates to apparatuses and methods for compressing screening assemblies to screening machines.

## SUMMARY

**[0002a]** In a first aspect, the present disclosure refers to a method of securing a screening assembly to a vibratory screening machine, comprising: placing a screening assembly on a screen receiving portion of a vibratory screening machine, where the screening assembly comprises a support member and a screening surface, the support member having front and rear edges, first and second side edges, a top surface, a bottom surface and a first plurality of mounting apertures located on the first side of the support member, each mounting aperture including at least one compression surface, wherein the screening surface is attached to the top surface of the support member, wherein placing the screening assembly on the screen receiving portion of the vibratory screening machine comprises locating the screening assembly such that a first plurality of compression pistons of compression mechanisms on the vibratory screening machine are aligned with corresponding ones of the first plurality of mounting apertures; and causing the first plurality of compression pistons to move from a retracted position to an extended position located closer to a centerline of the support member than the retracted position, wherein each of the compression pistons includes first and second compression surfaces that meet at a compression corner, and wherein when each of the first plurality of compression pistons move from the retracted position to the extended position, the at least one compression surface of a mounting aperture rides along one of the first and second compression surfaces of

the compression piston until the at least one compression surface of the mounting aperture rests against the compression corner, and wherein resultant compressive forces applied to the first plurality of mounting apertures by the first plurality of compression pistons cause the screening assembly assume a concave shape and to be pushed into engagement with underlying concave support surfaces of the vibratory screening machine.

**[0002b]** In a second aspect, the disclosure refers to a method of securing a screening assembly to a vibratory screening machine, comprising: placing a screening assembly on a screen receiving portion of a vibratory screening machine, where the screening assembly comprises a support member and a screening surface, the support member having a front and a rear, first and second sides, a top surface, a bottom surface, a plurality of flow through apertures and a first plurality of mounting apertures along the first side, each mounting aperture including at least one compression surface located on an inner side of the mounting aperture relative to a centerline of the support member, wherein the screening surface is attached to the top surface of the support member, wherein placing the screening assembly on the screen receiving portion of the vibratory screening machine comprises locating the screening assembly such that a first plurality of compression pistons of compression mechanisms on the vibratory screening machine are aligned with the first plurality of mounting apertures; and causing the first plurality of compression pistons to advance toward a centerline of the support member, wherein each of the first plurality of compression pistons has at least one compression surface that is configured to bear against a compression surface of a mounting aperture such that when the first plurality of compression pistons advance toward the centerline of the support member, resultant compressive forces applied to the compression surfaces of the first plurality of mounting apertures include a first component that is oriented horizontally toward the centerline of the support member and a second component that is oriented vertically downward, wherein the resultant compressive forces cause the screening assembly flex into a concave shape where a center of the support member is lower than the sides of the support member, and wherein the resultant compressive forces cause the support member to be pushed into engagement with underlying concave support surfaces of the vibratory screening machine.

**[0002c]** In a third aspect, the disclosure refers to a screen assembly configured to be mounted on a receiving portion of a vibratory screening machine that includes a plurality of compression

mechanisms, each of the compression mechanisms including a compression piston, the screen assembly comprising: a support member having a front and a rear, first and second sides, a top surface, a bottom surface, a plurality of flow through apertures and a first plurality of mounting apertures located along the first side, each mounting aperture including: at least one compression surface located on an inner side of the mounting aperture relative to a centerline of the support member, wherein the at least one compression surface is configured to contact a corresponding compression surface of a compression piston as the compression piston is advanced toward the centerline of the support member such a resultant compressive force applied to the at least one compression surface of the mounting aperture includes a first component that is oriented horizontally toward a centerline of the support member and a second component that is oriented vertically downward, and an alignment slot configured to receive an alignment finger of a compression piston; and a screening surface mounted on the top surface of the support member.

**[0002d]** In a fourth aspect, the disclosure refers to a method of securing a screening assembly to a vibratory screening machine, comprising: placing a screening assembly on a screen receiving portion of a vibratory screening machine, where the screening assembly comprises a support member and a screening surface, the support member having a front and a rear, first and second sides, a top surface, a bottom surface, a plurality of flow through apertures and a first plurality of mounting apertures located along the first side, each mounting aperture including a compression surface located on an inner side of the mounting aperture relative to a centerline of the support member, wherein the screening surface is attached to the top surface of the support member, wherein placing the screening assembly on the screen receiving portion of the vibratory screening machine comprises locating the screening assembly such that a first plurality of compression pistons of compression mechanisms on the vibratory screening machine are aligned with the first plurality of mounting apertures; and causing the first plurality of compression pistons to advance toward the centerline of the support member, wherein each of the first plurality of compression pistons has at least one compression surface configured to bear against a compression surface of a mounting aperture, the at least one compression surfaces of the compression pistons being configured such that when the first plurality of compression pistons are advanced toward the centerline of the support member and bear against the compression surfaces of the first plurality of mounting apertures, resultant compressive forces applied to the compression surfaces of the first plurality of mounting apertures include a first component that is

oriented horizontally toward a centerline of the support member and a second component that is oriented vertically downward, wherein the resultant compressive forces cause the screening assembly to flex into a concave shape where a center of the support member is lower than the sides of the support member, wherein the resultant compressive forces cause the support member to be pushed into engagement with underlying concave support surfaces of the vibratory screening machine, and wherein the resultant compressive forces are sufficient to hold the screening assembly against the support surfaces of the vibratory screening machine while the screening assembly is subjected to vibratory forces that apply between 3G and 9G of acceleration to the screening assembly.

## BACKGROUND

**[0003]** Material screening includes the use of vibratory screening machines. Vibratory screening machines provide the capability to excite an installed screen such that materials placed upon the screen may be separated to a desired level. Oversized materials are separated from undersized materials. Over time, screens wear and require replacement. As such, screens are designed to be replaceable.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0004]** FIG. 1A shows a perspective view of a dual-trough vibratory screen machine with installed replaceable screen assemblies, in an embodiment.

**[0005]** FIG. 1B shows a perspective view of the dual-trough vibratory screen machine of FIG. 1A with one of the replaceable screen assemblies removed, in an embodiment.

**[0006]** FIG. 1C shows a side view of the vibratory screen machine of FIG 1A, in an embodiment.

**[0007]** FIG. 1D shows a perspective view of a single-trough vibratory screening machine with an installed replaceable screen assembly, in an embodiment.