United States Patent

Krause

[15] **3,706,376**

[45] **Dec. 19, 1972**

[54] **SCREEN WITH DIFFERENTLY TENSIONED SURFACE ZONES**

[72] Inventor: **Rudolf J. Krause,** Bad Homburg, Germany

[73] Assignee: **Rhewum Rheinische Werkzeug-und Machinenfabrik G.m.b.H.,** Remscheid-Luttringhausen, Germany

[22] Filed: **June 15, 1970**

[21] Appl. No.: **46,197**

[30] **Foreign Application Priority Data**

June 13, 1969 Germany .....G 69 23 765.6

[52] **U.S. Cl.** **209/347,** 209/365, 209/382, 209/404

[51] **Int. Cl.** **B07b 1/34**

[58] **Field of Search**.....209/357, 322, 323, 319, 347, 209/382, 404, 408, 364, 365 R, 313, 368, 310, 319, 403

[56] **References Cited**

UNITED STATES PATENTS

2,804,208	8/1957	Van Hardefeld et al.	209/403
1,904,032	4/1933	Roberts	209/382 X
3,070,230	12/1962	Peterson	209/310
3,225,926	12/1965	Dostatni	209/368 X
359,544	3/1887	Russell et al.	209/357 X
878,728	2/1908	Harrop	209/382 X
1,477,028	12/1923	Blodgett	209/347
2,010,256	8/1935	Cole	209/403X
2,114,406	4/1938	Simpson	209/408 X
2,134,240	10/1938	Sowder	209/382

FOREIGN PATENTS OR APPLICATIONS

627,027	5/1927	France	209/403
578,893	7/1924	France	209/403

Primary Examiner—Tim R. Miles
Assistant Examiner—Ralph J. Hill
Attorney—Spencer & Kaye

[57] **ABSTRACT**

A sifting machine has a strainer box defining feed-in and discharge points and a free sieve netting surface arranged and tensioned in the strainer box so that a material flow-path is defined across it from the feed-in point to the discharge point. A plurality of striker assemblies may also be arranged in the strainer box for exciting the netting surface. A plurality of fastening and tensioning devices such as clamps are provided along the edges of the netting which are parallel to the direction of the material flow-path for individually tensioning the netting, in a direction transverse to the flow-path, at different points spaced in the direction of the flow-path such that the netting is transversely tensioned to different tensions along the direction of the flow-path. Similar devices may be provided along at least one edge of the netting parallel to the material flow-path for individually tensioning the netting, in the direction of the flow-path, at different points spaced transversely to the direction of the flow-path. The striker assemblies may be operated synchronously or asynchronously.

7 Claims, 8 Drawing Figures

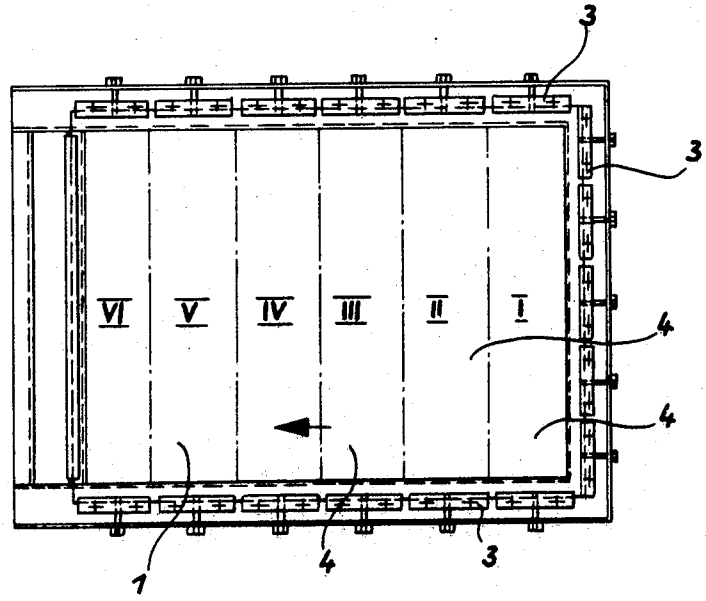


FIG.2

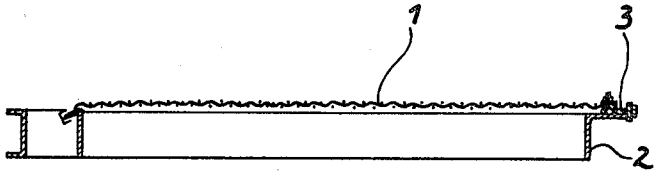


FIG.3

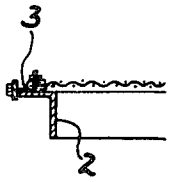


FIG.1

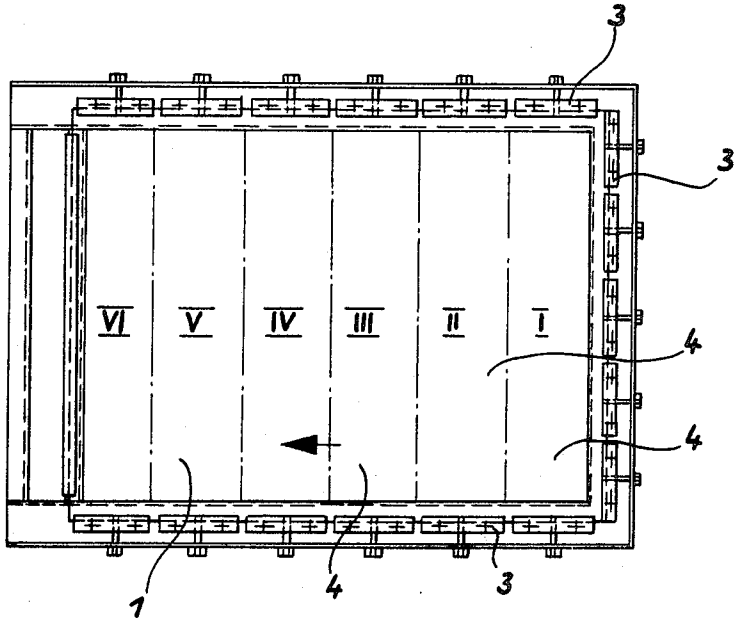
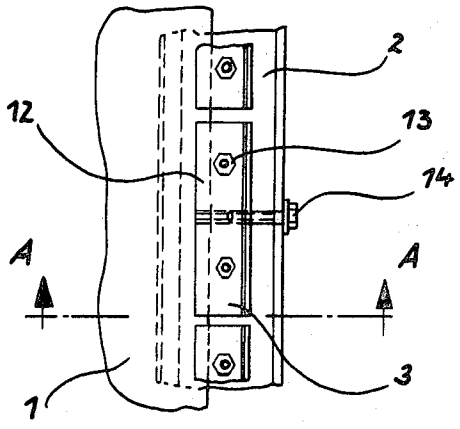


FIG.5



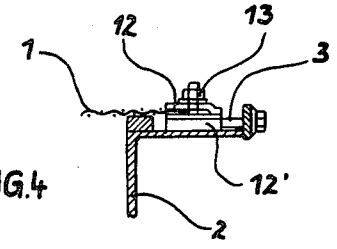


FIG.4

INVENTOR

Rudolf J. Krause

BY Spencer & Kaye

ATTORNEYS.

FIG. 6

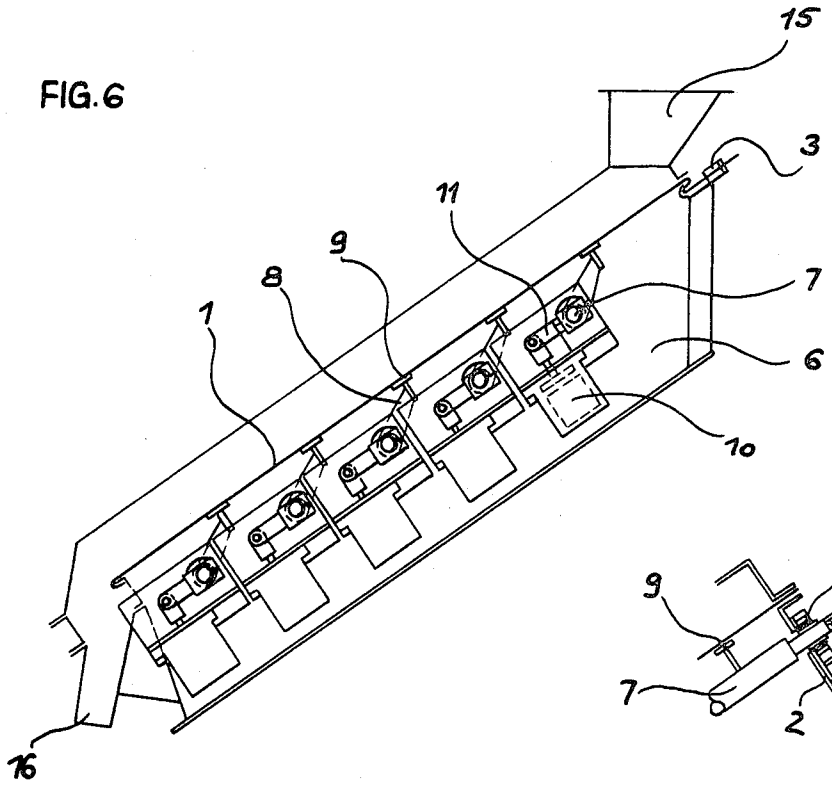
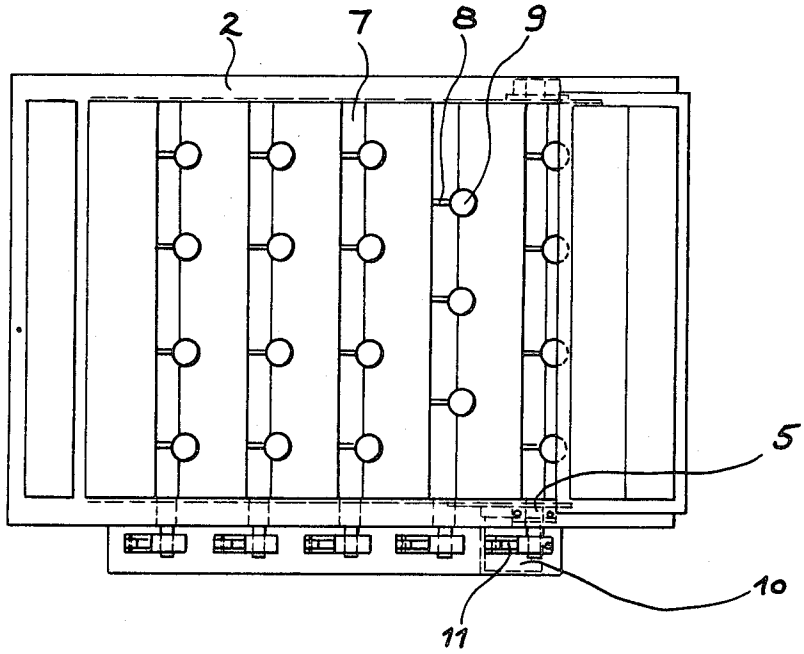


FIG. 8

FIG. 7



INVENTOR

Rudolf J. Krause

BY Spencer & Kaye

ATTORNEYS.

SCREEN WITH DIFFERENTLY TENSIONED SURFACE ZONES

BACKGROUND OF THE INVENTION

The invention relates to a sifting machine of a known type having a strainer box, a sieve netting sheet constructed of a wire netting or a textile netting having properties similar to a wire netting, a feed inlet and a discharge opening for the material, and striker assemblies for the excitation of the sieve netting.

It is known in sifting machines to drive the sieve netting directly by striking it, the strainer box itself generally remaining at rest; or to drive the netting indirectly by striking the box or frame. In the sifting machine according to the present invention the screen netting surface is free and directly struck, and the strainer box remains at rest as the support for all the components and assemblies of the sifting machine.

It is further known to systematically distribute a number of striker assemblies over the entire extent of the netting and to have them operate in synchronism, individually, or in groups. It is also known to clamp the sheet of netting into the strainer box frame either along the longer sides, along the frontal sides, or along all sides, with rigid edges and with partially substantial pretensioning. A proposal has also become known for clamping the entire sheet of netting without pretensioning it, so that it is tensioned only by the weight of the material. All these methods of fastening the netting have in common that the netting has imparted to it a tension which is uniform over its entire extent.

In these known sifting machines, the sifting characteristic obtained is determined by the tension of the netting and is substantially uniform and unchangeable; its intensity being influenceable only by the variations in the strikers. This uniform intensity causes the netting to be stressed differently and it can not be adapted to these variations. Consequently the netting is quickly destroyed. The netting tension can not follow the varying operating conditions during the passage of the material to be screened from the feed-in point to the discharge point, so that the sifting process is also incomplete.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome the disadvantages set out above and which promises optimum results in the sifting process.

This is substantially accomplished according to the present invention by tensioning the netting surface at different points into different tension levels over its entire extent transverse to the conveying direction; which differing tension levels can be individually applied and with each tension level having its own associated striker. In this manner, it is possible to force as many different screening characteristics to the netting over its expanse as there are different tension levels. Thus, the netting tension may, for example, fall in stages from a substantial pretensioning nearest the feed-in point to just the tension of the material just before the discharge point; which even with synchronism of the strikers produces substantially improved sifting results. If the intensity of the strikers is now changed additionally from tension level to tension level and, in particular, is adapted to the respective tension level, — the strikers possibly operating in different time patterns from tension level to tension level, — the sifting machine can meet all possible conditions imposed on it and realize an optimum result for the sifting process as a result.

A further development of the significant inventive idea of the present invention provides for tensioning the netting surface at different points into different tension levels in the direction of conveyance, which different tension levels can also be individually applied. This measure substantially increases the possibilities for variations of the tensioning during the operation of the sifting machine in that, for example, the netting is provided, in the longitudinal, or conveying direction with alternating longitudinal tension levels which may be more or less strongly tensioned.

A feature of the present invention is that the edges of the sheet of netting are in engagement with fastening and tensioning elements corresponding to the extent and distribution of the tension levels; which elements together, except for the separating spaces between adjacent levels, clamp the edges of the netting without interruption.

A further feature of the present invention is that the strikers associated with the different tension levels have a common drive.

A still further feature of the present invention is that the strikers include beater levers which are disposed on a vibrating shaft mounted in the machine frame and extending transversely below the netting surface.

A particularity for providing a punctiform striker is that protruding circular heads, cups or plates having small diameters are disposed on the vibrating beater levers.

Another feature of the present invention is that the pivot bearings for the vibrating shaft of the strikers are rubber bearings and the vibrating shaft of the strikers is coupled, via a lever, with an electromagnetic drive which is mounted, as are the pivot bearings, to the frame of the machine.

A sifting machine constructed according to the present invention permits the arbitrary use of a drive subdivided into zones in cooperation with a netting surface which can also be tensioned to different levels corresponding to the zones; the movable parts being insertable into the strainer box in a dustfree, airtight, waterfree and maintenance-free manner while the easy exchangeability of a free sieve netting surface is maintained.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a sieve netting surface arranged in the frame of a strainer box.

FIG. 2 is a side elevation, cross-sectional view of the device of FIG. 1.

FIG. 3 is a portion of FIG. 2 in reverse orientation.

FIG. 4 is a cross-sectional view taken generally along line A—A of FIG. 5 of a detail on an enlarged scale of FIG. 2, showing a fastening and tensioning element.

FIG. 5 is a top plan partial view of the detail of FIG. 4.

FIG. 6 is a side-elevation schematic view of a sifting machine according to the present invention which has a plurality of striker assemblies.

FIG. 7 is a detail of a striker assembly taken at right angles with respect to FIG. 6.

FIG. 8 is a top plan view of the sifting machine of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 through 5 show an embodiment of the present invention without striker assemblies.

FIG. 1 shows a sheet of sieve netting 1 firmly clamped to a frame 2 of a sifting machine by means of a plurality of fastening and tensioning elements such as clamps 3 to define a screening surface. Clamps 3 are distributed along the edges of the netting 1 in correspondence with the number of tension levels desired. The exact spacing of the clamps 3 is, of course, a matter of choice. In this embodiment, six tension levels, numbered I–VI, are provided transverse to the conveying or arrow direction. Accordingly, six pairs of clamps 3 are oppositely disposed along both longitudinal edges of the netting 1.

Five clamps 3 are also provided across one end of the netting 1 so that the netting 1 is tensioned into five tension levels in the conveying direction. Although these tension levels are not indicated in FIG. 1 in the manner of zones I–VI, it is apparent that there is one level for each clamp 3.

FIGS. 2–5 show the details of the clamps 3. In particular, FIGS. 4 and 5 clearly show that the clamps 3 include jaws 12 which serve to clamp the netting 1 to a base plate 12′ by means of a bolt and nut 13. In addition, a bolt 14 is provided to adjust the tension of the netting 1 by moving it in a direction perpendicular to the extent of frame member 2. This arrangement permits the clamps 3 to be tensionable independently of one another so that the desired pretensioning of the netting can be individually set at different levels. Thus, the tensioning at a given point along the netting can be different from any other point along the netting.

FIGS. 6–8 show a sifting machine with striker assemblies that may use the tensioning concept set out above. That is, a netting 1 may again be fastened and tensioned by a plurality of clamps 3. The strainer box 6 is provided with an inlet 15 and an outlet 16, between which the netting 1 extends. A plurality of striker assemblies are arranged beneath the surface of the netting 1.

Each striker assembly is made up of a beater lever 8 which has a head 9 and is fastened to a shaft 7 mounted in rubber bearings 5 in the wall of the strainer box 6 (FIGS. 6 and 7). Circular head 9 of FIGS. 6–8 may have the form of a cup or plate as well. The shaft 7 is connected to a known electromagnetic drive 10 by means of a lever 11. This arrangement permits the shaft 7 to vibrate in the rubber bearings, utilizing the elasticity of the rubber to vibrate in tune with the drive 10. The drive 10 is driven in a known manner at the line frequency, and emits high-frequency harmonics when lever 11 contacts it, so that the armature vibrations of the drive 10 are transmitted to the shaft 7 via lever 11. The rubber bearings 5 additionally provide a dust-free and maintenance free bearing for the shaft 7.

In the sifting machine according to FIGS. 6 through 8, the striker assemblies are arranged to occupy defined zones which are associated with the respective tension levels, as can be seen from FIG. 8. These zones are also identified by the numbering I–VI. A plurality of strikers in one of the zones I–VI may be mounted on a common shaft 7 connected to a single drive 10. This provides a common drive for all of the strikers of a common transverse zone. The striker assemblies associated with the various zones can be driven either synchronously or asynchronously by suitable control means that is well known in the art. For example, each drive 10 could be adjusted manually. Therefore, the netting can be controlled by imposing varying tension levels as well as by the excitation of the striker assemblies. Thus, the sifting machine according to the present invention can be adapted to any desired requirements.

It will be understood that the above description of the present invention is susceptible to various modifications, changes and adaptations, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

I claim:

1. In a sifting machine including a strainer box with feed-in and discharge points therein, a one-piece netting defining a material flow surface and having two opposite end portions, two opposite lateral edge portions and a free portion extending from one of the edge portions to the other, means for fastening the two lateral edges to the strainer box to thereby tension the netting, the netting defining a flow-path for the material to be screened said flow-path extending from a feed-in point at one end portion of the screen to a discharge point at the other end portion of the screen and extending longitudinally over the free portion of the netting, and a plurality of striker assemblies arranged in the strainer box adjacent to the free portion of the netting for direct excitation of the netting, the improvement wherein the fastening means comprise a plurality of individual fastening devices which are arranged along the lateral edge portions of the netting and are spaced in the direction of the flow-path for individually tensioning the netting, in a direction transverse to the flow-path, at different points spaced in the direction of the flow-path such that the netting is transversely tensioned to different tensions along said direction of the flow-path, and wherein said striker assemblies are likewise spaced in the direction of the flow-path for separately exciting the differently tensioned portions of the netting.

2. A sifting machine as defined in claim 1, wherein said fastening means comprise a plurality of further individual fastening devices which are spaced along one of said end portions for individually tensioning the netting, in the direction of the flow-path, at different points spaced transversely to the direction of the flow-path such that the netting is longitudinally tensioned to different tensions along the transverse direction.

3. A sifting machine as defined in claim 1, wherein all of the striker assemblies which are aligned in a direction transverse to the flow-path have a common drive.

4. A sifting machine as defined in claim 3, wherein each of said striker assemblies has a beater lever and a vibrating shaft mounted in the strainer box and operatively coupled with said common drive and said beater lever, and wherein said striker assemblies are arranged below the netting surface.

5. A sifting machine as defined in claim 4, wherein each of said striker assemblies has a small diameter protruding circular member mounted on said beater lever.

6. A sifting machine as defined in claim 5, further including rubber bearings for mounting said vibrating shaft, and wherein said common drive is an electro-magnetic drive and each of said striker assemblies has a lever operatively coupled to said electro-magnetic drive and said vibrating shaft.

7. In a method of sifting material, the steps of tensioning a one-piece netting, over which material to be sifted flows along a flow-path extending from one end of the net to the other and between the lateral edges of the net, in a direction transverse to the flow-path such that the netting is tensioned to different tensions at different points spaced in the direction of the flow-path, and applying separate striker excitation to the differently tensioned portions of the netting.

* * * * *