

- [54] **WEAR BALANCED CLEAT FOR COMPACTION WHEEL**
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- [73] Assignee: **Rexnord Inc.**, Milwaukee, Wis.
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- [21] Appl. No.: **388,334**

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Primary Examiner—Roy D. Frazier
Assistant Examiner—Thomas J. Holko

- [52] U.S. Cl. 404/121; 301/43; 404/124
- [51] Int. Cl.²..... E01C 19/26
- [58] Field of Search 404/121, 124; 172/122, 172/540, 554; 301/43, 44 R, 44 T, 44 A, 44 B

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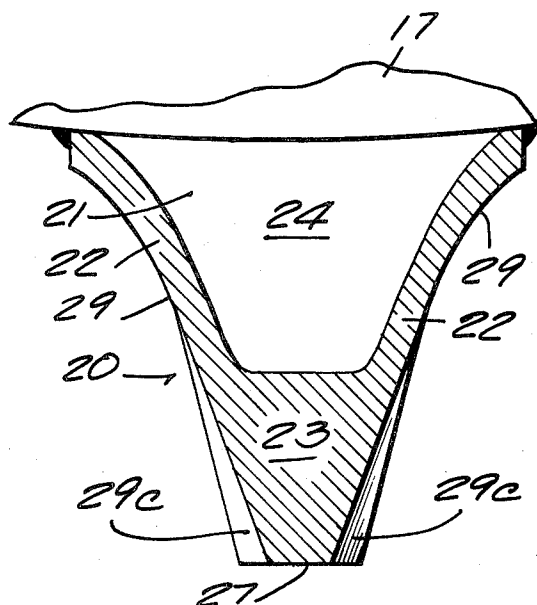
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[57] ABSTRACT

The wheels of a landfill compaction vehicle have cylindrical rims and circumferential rows of radially projecting cleats. Each cleat includes an approximately square base joined to the wheel rim and a radially outward working face having a "dog-bone" outline with its longer dimension extending axially of the wheel.

6 Claims, 13 Drawing Figures



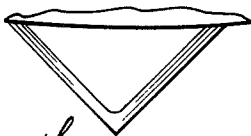
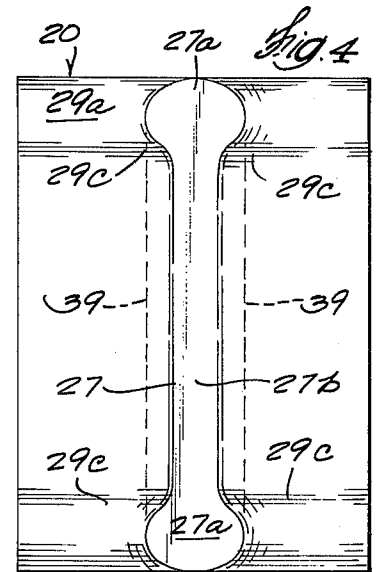
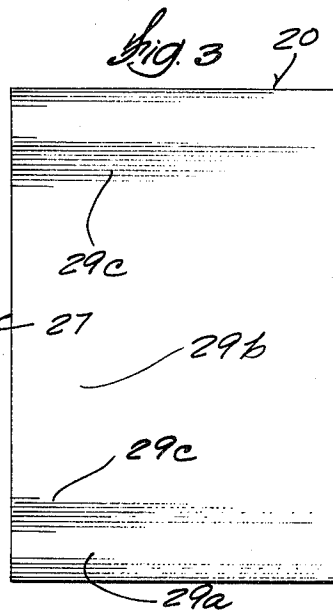
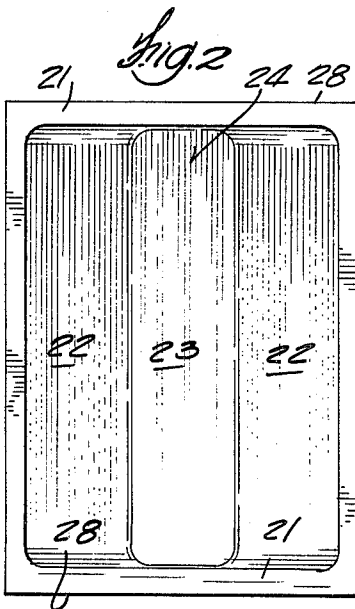
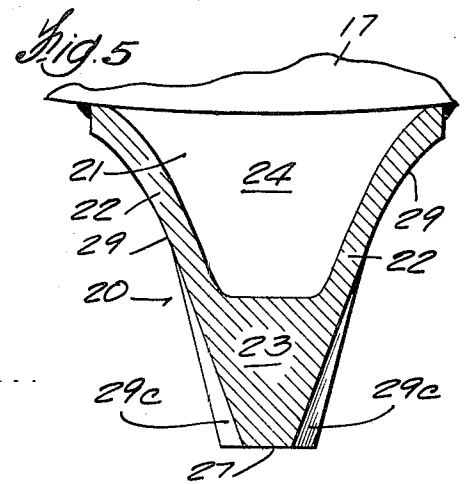
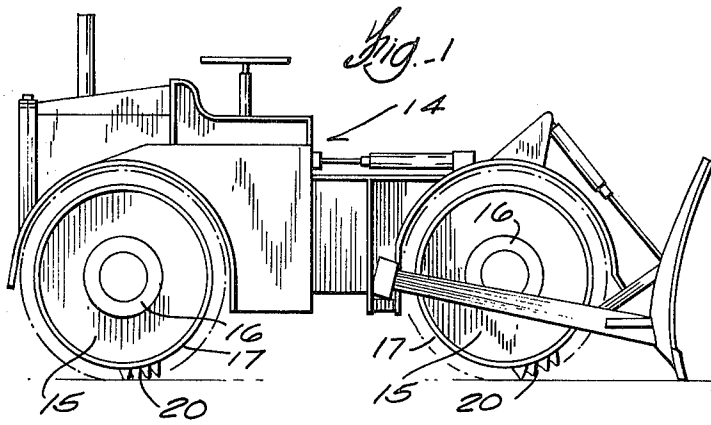


Fig. 6
PRIOR ART

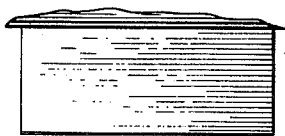


Fig. 8
PRIOR ART

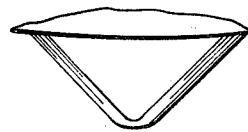


Fig. 7
PRIOR ART

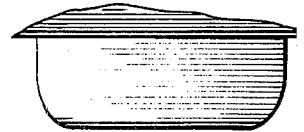


Fig. 9
PRIOR ART

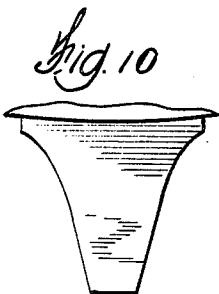


Fig. 10

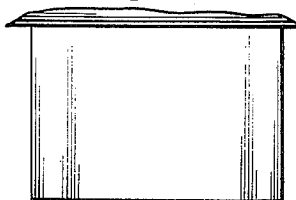


Fig. 12

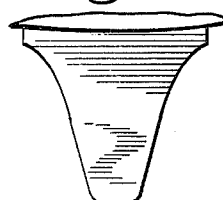


Fig. 11

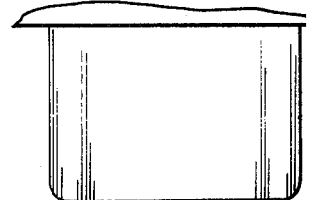


Fig. 13

WEAR BALANCED CLEAT FOR COMPACTION WHEEL

BACKGROUND OF THE INVENTION

1. Field of the Invention

Apparatus for making roads or pavements, with rollers having projections or recesses, Class 94/50 PR.

2. Description of the Prior Art and Problems Solved

The prior art includes V-shaped cleats having sharp cutting edges and various entrant angles. The cutting edge, except in only some instances extends generally axially of the wheel.

U.S. Pat. No. 3,463,063 shows a landfill compaction vehicle which has had considerable commercial success by reason of the claimed invention and the present invention is a further improvement thereover.

While the drawings of the patent indicate well defined edges, in actual use these edges are immediately rounded off due to wear even before the pattern of general wear becomes apparent.

One of the phenomena as to the wear pattern which has been observed is that V-shaped cleats become very rounded at their radially outer corners although the vehicle operates only in a forward and reverse direction and the abrasive moment of the supporting material relative to the cleat would seem to be in one or the reverse direction.

Apparently this is not the case. Whatever occurs appears to be due to the square ends of the cleats, square here meaning that the ends are normal to the wheel axis. It is believed that the compacted soil which is under compression nearer the center of each cleat, that is intermediate its ends, apparently moves up the inclined face of the cleat only to some extent whereas the material nearer the radially outer corners is induced to move a further distance toward the ends of the cleats referred to where the soil is not under compression. This apparently explains the extreme rounding at the ends of such cleats which occurs.

The sideward motion of the machine has also been considered to contribute to that effect. Whether it is significant, the present invention, of course, provides the same improvement.

Reference both to the cutting edge and the working face of the cleat has been made. The references are to the same part of the cleat but the term cutting edge implies a modestly sharp edge at least as the cleat is manufactured whereas the term working face infers that the face initially is more flat.

SUMMARY OF THE INVENTION

The inverted V-shaped cleat for a compaction vehicle is provided with enlarged outer corners such that the working face of the cleat has enlarged end portions and a narrow central portion and each of the inclined faces of the cleat has a corresponding recessed or indented central portion. The inclined faces are also concave as viewed endwise so that the base of the cleat has an ample circumferential dimension for stability whereas the outer end portion of the cleat has a relatively long taper for good penetration of the landfill and a favorable angle for traction of the vehicle.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 shows the compaction vehicle shown in reference U.S. Pat. No. 3,463,063.

FIG. 2 shows the base of one of the cleats in plan, the base being that part which fits the cylindrical rim of a wheel of the vehicle.

FIG. 3 is a side elevation of the cleat.

FIG. 4 is a plan of the cleat and of its working face.

FIG. 5 is a cross section of the cleat looking toward one end of the cleat.

FIGS. 6 and 7 are end elevations of the prior art cleat showing the same before and after a normal period of service and wear.

FIGS. 8 and 9 are side elevations of the same prior art cleat and show the considerably greater wear or rounding of the radially outer corners which occurs in the same period of service.

FIGS. 10 and 11 are end elevations of the cleat of the present invention showing the cleat before and after the same normal period of service and wear.

FIGS. 12 and 13 are similar side elevations of the same cleat and showing by contrast approximately the same wear as shown in FIGS. 8 and 9 and in the same period of service.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The self propelled vehicle 14 shown in FIG. 1 includes the wheels 15 which are in the order of 5 feet in diameter. Each wheel 15 includes an inner section having a central bolt mounting ring 16 and an outer cylindrical rim 17 up to 3 feet in width, that is measured axially of the wheel. Each wheel 15 also includes a number of rows of equally spaced cleats 20. The rows extend circumferentially of the wheel and the cleats of adjacent rows are circumferentially offset so that the ends of adjacent cleats are relatively unobstructed.

Each cleat may be forged or possibly fabricated of welded steel plate. The cleats 20 as shown are cast of a relatively wear resistant steel. Each cleat 20 includes the parallel end walls 21, the relatively inclined side walls 22 and the solid cap 23. Each cleat is an integral structure having the recess 24 and the several outer surfaces which are of a special configuration as will be described. The base surface of cleat 20 opposite cap 23 is of a rectangular outline and is curved slightly to fit rim 17 of a wheel. The cleat is securely welded to the rim around the base of the cleat and preferably so that recess 24 is closed by rim 17.

The outer surfaces of the cleat include the radially outward working face 27, the parallel end faces 28 which are normal to the axis of rim 17, and the concave wedge faces 29. The faces 28 and 29 extend from rim 17 to working face 27.

The special configuration of cleat 20 is characterized by the bulbous enlargements at the radially outer corners of the cleat. The enlargements are such that the working face 27 has a "dog-bone" outline which includes the generally round end portions 27a and the narrow central portion 27b. The enlargements are also such that the wedge faces 29 have relatively projecting end portions 29a and indented central portions 29b which correspond with portions 27a and 27b of the working face.

The improvements in the cleat 20 and in the wheels 15 provided with such cleats resides first in the concave profiles of the wedge faces 29 and second in the recessed central portions thereof and the intermediate shoulders 29c.

The concave profile referred to provides the wedge faces with a relatively narrow taper in the order of 20° from about its midsection to the working face 27 whereas from the base of the cleat to the midsection the taper is in the order of 45°. This allows the base to be relatively broad circumferentially of the wheel whereas the wedge face providing the traction for the vehicle has an angle of only 10° relative to a radial plane extended from the rotational axis of the wheel.

The second improvement resides in the altered wear pattern of the cleat which is due to the additional cleat material at the radially outer corners of the cleat. Normally such corners are worn away at a rate generally much faster than the wear over that part of the cleat which is intermediate the corners referred to, and shown in FIGS. 6-9. The FIGS. have been described and it should be merely necessary to point out again that the greater rounding at the radially outer corners of the cleat as shown in FIG. 9 is representative of the observed wear of innumerable cleats after actual use. It is believed that such rounding is due to the shifting of the material which is compacted by one or both wedge faces. This material appears to shift toward the material which is uncompacted at the ends of the cleat where the cleat is "square" or normal to the wheel axis.

Thus, the shoulders 29c of cleat 20 are considered especially significant in preventing such shifting, at least in part. It should be understood also that the material is not at all fluid in the broad sense, except where the vehicle is operating in sand which may have been used as a sanitary land fill cover.

FIGS. 10-13 are representative of the relatively equal wear which has been observed after a period of service of cleats 20 comparable to that shown in FIGS. 6-9.

It might be reasoned that the entire cleat should be enlarged such that the working face has the outline indicated by the broken lines 39 shown in FIG. 4. Such a cleat would not be effective to puncture the material to be compacted in a land fill site and further, would become rounded in a manner no different than that shown in FIGS. 6-9.

The working face area relative to the height and base of cleat 20 is thus of significance. Generally, the height should be about equal to the circumferential dimension of the base and the circumferential dimension should be between one tenth and one fifth that of the base, the circumference being that of the wheel. The "dog-bone" outline generally means that the central section is about one half the width of the ends or of the radially outer corners of the cleat.

It is noted also that the prior art U.S. Pat. No. 3,463,063 is directed to the arrangement of the cleats such that rows of diagonal dirt ejection slots are provided. The cleat 20 is particularly adapted for such purposes in that the wear-rate at the radially outer corners of the cleat is extended to allow for such lateral movement of the compacted material. However, the shoulders 29c should preferably extend only from about the midsection of the cleat to the working face so that the concave wedge faces nearer the base section of the cleat are not indented and allows for such dirt ejection.

We claim:

1. In a wheel for a vehicle used to compact sanitary land fill, said wheel comprising:

a. a rigid cylinder forming a rim;

b. hub mounting means upon which the cylinder is secured; and

c. ground engaging substantially V-shaped, symmetrical inverted cleats secured to the cylinder in circumferential rows, the cleats of adjacent rows being circumferentially offset and each cleat having

i. an approximately square base,

ii. opposite triangular ends generally normal to the wheel axis,

iii. convergent wedge faces intermediate said ends, and

iv. a working face opposite said base and intermediate said ends and said wedge faces,

the improvement wherein:

1. said working face has relatively wider end portions adjacent the radially outer corners of the cleat and a narrower intermediate portion, the length and width of the end portions in the axial and circumferential directions each being between one-fifth and one-tenth of the length and width of said base and the width of the intermediate portion being one-half or less the width of the end portions and
2. said wedge faces have end and intermediate portions which merge with the corresponding portions of said working face, the intermediate portions of said wedge faces being recessed relative to the end portions thereof.

2. The wheel of claim 1 wherein said wedge faces converge

a. at an angle in the order of 45° near their respective bases and

b. at an angle in the order of 20° near their respective working faces.

3. The wheel of claim 1 wherein each cleat is of hollow cast construction with an open base.

4. In a cleat for a wheel of a vehicle used to compact sanitary land fill, said cleat having:

a. an approximately square base,

b. opposite generally triangular ends,

c. convergent wedge faces intermediate said ends, and

d. a working face opposite said base and intermediate said ends and said wedge faces,

the improvement wherein

- i. said working face has relatively wider end portions adjacent said generally triangular ends and a narrower intermediate portion, the length and width of the end portions each being between one-fifth and one-tenth of the length and width of said base and the width of the intermediate portion being one-half or less the width of the end portions and
- ii. said wedge faces have end and intermediate portions which merge with the corresponding portions of said working face, the intermediate portions of said wedge faces being recessed relative to the end portions thereof.

5. The cleat of claim 4 wherein said wedge faces converge

a. at an angle in the order of 45° near said base and

b. at an angle in the order of 20° near said working face.

6. The cleat of claim 4 wherein the cleat is of hollow cast construction with an open base.

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