(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 179 567**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **85306692.6**

(51) Int. Cl.[4]: **E02D 3/026**

(22) Date of filing: **19.09.85**

(30) Priority: **21.09.84 US 653661**

(43) Date of publication of application:
30.04.86 Bulletin 86/18

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

(71) Applicant: **Caron Compactor Company**
1600 Sunrise Avenue Suite 2A
Modesto California 95350(US)

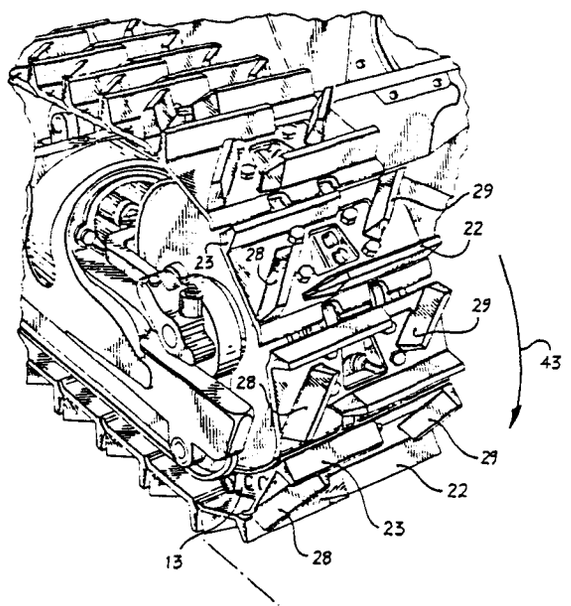
(72) Inventor: **Caron, James Oliver**
2705 Konynenburg Lane
Modesto California 95356(US)
Inventor: **Pratt, Kenneth Harold**
1813-C Edgebrook
Modesto California 95354(US)

(74) Representative: **Alexander, Thomas Bruce et al**
Boult, Wade & Tennant 27 Furnival Street
London EC4A 1PQ(GB)

(54) Demolition and compaction track shoe and assembly for crawler vehicle.

(57) A demolition and compaction track shoe and assembly for a crawler vehicle includes a central opening (21) and downwardly protruding diagonally oriented demolition blades (28,29) cooperating with transversely oriented grouser blades (22,23). The demolition blades provide support to the shoe intermediate the grouser blades to thereby give a smoother ride. The central opening allows material compacted behind the shoe to escape and channels between the grouser and demolition blades allow such material to discharged from the shoe during the non-ground-engaging part of the track cycle. The invention has application to land fill operations and in agriculture where stubble is to be broken up prior to discing.

FIG_1



EP 0 179 567 A2

DEMOLITION AND COMPACTION TRACK SHOE AND ASSEMBLY FOR CRAWLER VEHICLE

This invention pertains to crawler type vehicles and more particularly to an improved cyclic track assembly for same suitable for demolition and compaction of fill materials such as earth, debris, solid wastes, trash, etc.

Previously, wheeled vehicles having special compacting feet have been used in compacting sanitary land fills, dumps, construction sites, etc. Also, track type tractors using tracks designed solely for tractive purposes have been used for this purpose. Such vehicles have had certain limitations. For example, they have had difficulty in effectively demolishing large rocks, pieces of concrete, etc., as encountered at construction sites Also, when compacting "wet" materials using the usual track type tractor, it has been observed that the materials become impacted behind the track shoes so as to tighten the tracks unduly.

Further, in compacting fill materials such as trash and earth at a sanitary land fill site, it has been found to be more efficient if the trash is demolished prior to or during compaction of the fill materials so that smaller debris can be compressed into the earth.

In addition, where corn stubble has been left in a field after harvesting, wheel-style compactors have a limited ability to break up the stubble prior to discing the stubble into the ground. Since burning of stubble has been prohibited in many areas it must now be disced into the ground.

A crawler vehicle equipped with track shoes or pads as disclosed herein readily serves to break up the stubble even more thoroughly than when using only the disc.

Thus, there has been a need for an improved compactor for use on sanitary land fills, transfer stations for garbage, and for construction and demolition sites.

According to the present invention there is disclosed a crawler vehicle for use in compacting a fill of earth and debris, the vehicle being of a type supported by spaced parallel endless tracks in which the tracks include a plurality of articulated links supporting track shoes, characterized by said shoes each comprising a broad, rigid plate having top and bottom surfaces, a substantial region of the bottom surface acting as a tread surface for engaging the ground, a relief opening formed to extend centrally through said tread surface, said opening being sufficiently large to readily pass fill materials outwardly therethrough to inhibit buildup of impacted materials on the back side of said track shoes, a pair of grouser blades and a pair of demolition blades carried to protrude generally normal to said tread surface of said track shoes, said demolition and grouser blades being disposed to define escape channels for readily permitting material discharged from said opening to freely leave the track shoe.

Preferably said pair of grouser blades respectively extend along a substantial portion of the leading and trailing edge margins of said tread surface, said grouser blades being mutually offset laterally to opposite sides of the centerline of the path of movement of the track shoes, and said pair of demolition blades extend diagonally substantially in parallel relation respectively from the leading and trailing edge margins of said tread surface toward said trailing and leading edge margins for demolishing debris, said demolition blades being spaced from said grouser blades to define said channels for passing the material discharged from said opening free of said track.

According to a further aspect of the invention there is disclosed a track shoe for a vehicular crawler track of a type for crushing, breaking, grinding and compacting a fill of earth and debris materials, characterized by said shoe comprising a broad, rigid plate having top and bottom surfaces, a substantial region of the bottom surface acting as a tread surface for engaging the ground, a relief opening formed to extend centrally through said tread surface, said opening being sufficiently large to readily release fill materials outwardly therethrough to inhibit buildup of impacted material behind said track shoe, a pair of grouser blades protruding generally normal to said tread surface and respectively extending along a substantial portion of the leading and trailing edge margins of said tread surface, said grouser blades being mutually offset laterally to opposite sides of the centerline of the path of movement of the track shoes, first and second demolition blades protruding generally normal to said tread surface and extending diagonally respectively from the leading and trailing edge margins of said tread surface toward said trailing and leading edge margins, said demolition blades being spaced from said grouser blades to define gaps therebetween serving to channel the material released from said opening free of said shoe.

According to a still further aspect of the invention there is disclosed a crawler vehicle characterised by some of said shoes having top and bottom surfaces wherein a substantial region of the bottom surfaces serves as a tread surface for engaging the ground, a pair of grouser blades carried by said tread surface extending substantially normal to the path of its associated track, said grouser blades being spaced apart along said path, demolition means carried by and protruding from said tread surface, said demolition means being disposed to substantially continuously support said shoes in the region extending between said grouser blades as the shoe progressively engages the ground to enhance stability of said track.

Preferably the demolition means includes a pair of demolition blades carried to protrude from said surface and extend diagonally of said path, an end of each of said demolition blades invading the plane of an associated grouser blade, the other end of each of said demolition blades extending substantially through an imaginary plane common to each of said other ends, said imaginary plane being disposed substantially normal to said path and intermediate said pair of grouser blades.

An advantage of the invention is to provide an improved compactor vehicle wherein the tread reduces the fill materials (such as concrete blocks, rocks, solid waste, etc.) before it grinds them into the ground.

Another advantage of the invention is to provide a compactor vehicle having crawler tracks which "run clean," i.e., remain substantially free of any significant impacted buildup of fill material behind or in the tread.

Yet another advantage of the invention is to provide an improved crawler track which enhances stability and smoothness of operation of a compaction vehicle. Particular embodiments of the invention will now be disclosed by way of example only and with reference to the accompanying drawings of which;

Figure 1 shows a diagrammatic perspective view of the leading end of a crawler track, according to the invention;

Figure 2 shows a diagrammatic perspective view of a track type vehicle supported by track assemblies according to the invention;

Figure 3 shows an enlarged detail perspective view of a track shoe according to the invention;

Figures 4 and 5 respectively show bottom plan and end

elevation views of a track shoe according to the invention and inverted as when out of contact with the ground;

Figure 6 shows a diagrammatic representation of the passage of debris from behind the track shoe and away from the tread surface;

Figure 7 shows a diagrammatic side elevation view of a track assembly for the vehicle in Figure 2, and

Figure 8 shows a diagrammatic plan view of two links coupled in tandem taken from the track assembly of Figure 7.

A crawler vehicle 10 for use in compacting a fill of materials, such as earth and debris, employs a pair of spaced parallel endless track assemblies 11, 12, shown in greater detail in Figures 1 and 7. Track assemblies 11, 12 include a plurality of articulated links 13 coupled in tandem to form an endless or cyclic "belt". Links 13 support track shoes 14 secured thereto by means of bolts 16.

Vehicle 10 uses its tracks to demolish and compact a fill of materials such as earth and debris, rocks, refuse, etc.

Each shoe 14 comprises substantially a rigid rectangular plate 17. Plate 17, for purposes of explanation, includes a top and a bottom surface 18, 19 respectively (Figures 4, 5). As used herein the term "bottom" surface pertains to that surface which acts as a tread surface for engaging the ground as vehicle 10 is moved. It will be readily evident, however, that the "bottom" surface 19, when inverted, (as in Figures 4 and 5) becomes a "top" surface during a substantial portion of its cyclic travel.

A relief opening 21 in the form of a relatively large trapezoidal shaped opening extends centrally through shoe 14. Opening 21 is sufficiently large to readily release fill material outwardly therethrough so as to inhibit the buildup of compacted materials behind shoe 14.

As shown, for example, in Figure 5 the leading or left-hand edge 19b curves slightly downwardly so as to slide under the trailing edge 19c of a shoe 14 preceding it in track assembly 11. The leading edge margin 24 of plate 17 serves to provide a closure between shoes disposed in tandem along track assembly 11. Accordingly, as the shoes 14 travel a horizontal stretch of their path, edge margin 24 will be disposed beneath trailing edge 19c of a preceding shoe 14. The remainder of the bottom surface of shoe 14 provides a substantial region for engaging the ground referred to herein as the "tread" surface. Thus, as shown in Figure 4 the region defined within the dimensions x, y comprises the tread surface.

A drive sprocket 44 engages link pins 46 to move the track assembly. The sprocket points are aligned to pass directly beneath opening 21 whereby they can assist in urging impacted material out of opening 21.

As the shoes 14 travel around the ends of their cyclic path, edges 19b and 19c of adjacent shoes move to open and close a gap therebetween. This action as well as that of the drive sprocket 44 causes impacted materials to be urged outwardly through opening 21.

A pair of grouser blades 22, 23 carried from the bottom surface of shoe 14 protrude generally normal to the tread surface and respectively extend transversely of shoe 14 along a substantial part of the extent of the leading and trailing transverse edge margins, 26, 27 of tread surface x, y. Grouser blades 22, 23 are mutually offset laterally to opposite sides of the centerline of the path of movement of track shoes 14 for reasons described further below.

In addition, bottom surface 19 carries a pair of demolition blades 28, 29 which also protrude generally normal to the region of tread surface x, y. Blades 28, 29 extend diagonally substantially in parallel relation respectively from the leading and trailing edge margins 26, 31 toward the trailing and leading edge margins 31_1 26 respectively for purposes of demolishing debris while permitting any impacted material emerging from opening 21 to freely leave the track.

Grouser 22 includes a tapered fillet 22a which serves to strengthen plate 17 in the region of the leading edge 21a of opening 21 and the openings (not shown) for bolts 32. Thus, the bolt holes and the elongate edge 21a cause the adjacent portion of plate 17 to be the weakest portion. This weakening of a leading portion of plate 17 has thereby been stiffened by the inclusion of the tapered fillet 22a.

Both of blades 22, 23 extend only part way across the full width, y, of shoe 14 and are mutually offset to opposite sides of the centerline of the path of its associated track. Each displacement 33, 34 (Figure 4) respectively defined between the laterally inner ends of an associated grouser blade 22, 23 and a side edge 36, 37 of the rigid plate includes a gap 38, 39 respectively defined between the laterally inner end of an associated grouser blade and a portion of a demolition blade invading the plane of the grouser blade. Gaps 38, 39 serve to channel debris 42 away from shoe 14. Additional gaps or channels for debris to fall through are indicated at 38' and 39'. Demolition blades 28, 29 lie mainly behind an associated one of gaps 38, 39 in the path of fill materials 42 passing therethrough.

Assuming that Figure 6 represents a track shoe 14 moving upwardly in the direction of arrow 43 as the vehicle moves in a forward direction, i.e., as the track assembly is viewed from behind, impacted debris 42 in back of shoe 14 will be shaken loose by the relative movement between shoes 14 as they move around the end of their cyclic path as well as by the action of the drive sprocket 44.

As shoe 14 travels upwardly channels 39, 39' permit the loosened debris 42 to pass freely from shoe 14 by gravity. Channels 38, 38' perform this function when the track moves in a reverse direction.

Thus, as noted above, the tracks are designed to run "clean" so as to rid themselves of refuse and other fill materials rather quickly. For a demolition and compaction vehicle, use of the crawler style tracks further enhances this feature inasmuch as the shoes are drawn apart as they pass around the ends of the track. In this manner the tracks further tend to release material. This "track break" between consecutive shoes opens up a slot between shoes giving entrapped debris an opportunity to fall out. Further, by reducing the material in size before grinding it into the ground, the vehicle described above achieves compaction by a substantially different technique than previously.

It has been observed that track shoes 14 of the kind described serve to provide an improved and enhanced stability and smoother ride. Accordingly, shoe 14 includes means protruding therefrom to form a substantially continuous support beneath plate 17 in the region extending between grouser blades 22, 23. Thus, as each tread surface progressively engages the ground, it will be continuously supported from grouser 22 to grouser 23.

As shown best in Figures 1 and 3, and as indicated by arrow 43, as the track moves forward (for purposes of explanation) the leading grouser blade 22 will be the first to strike the ground. At substantially the same time, the leading end 28a of demolition blade 28 will make contact with

the ground followed by demolition blade 29. Ultimately, grouser blade 23 engages the ground and the entire shoe will then be in a substantially horizontal downwardly facing position while moving along the bottom reach of its track.

This progressive contact and continuous support beneath each shoe serves to eliminate much of the instability previously noted and causes the vehicle to ride more smoothly.

More particularly, one end 28a, 29a of each of demolition blades 28, 29 invades the plane defined by an associated one of the two grouser blades 22, 23 respectively. The other end 28b, 29b of each of blades 28, 29 extend substantially beyond an imaginary plane 41 common to each of the ends 28b, 29b, and disposed substantially to the path of an associated one of the tracks 11, 12. Plane 41 lies between the pair of grouser blades 22,23.

It has been observed that the use of a compaction vehicle 10 of the kind described characterized by the demolition blades and shoe design provides enhanced reduction of concrete blocks, rocks, wood products and the like encountered at building sites so that the debris material is reduced in size merely by driving the vehicle back and forth across the debris.

It has further been observed that a vehicle equipped with tracks of the kind described achieves the desired results more quickly than previously whereby the machine actually is called upon to work fewer hours with attendant fuel and labor savings.

The smoother ride created by the diagonal segments prevents the machine from rocking and falling from one grouser to the next and enhances the comfort of the operator as well as reducing metal fatigue and machine damage.

Finally, it has been noted that in many farming communities it is unlawful to burn corn stubble so that farmers in such areas are required to disc the corn stubble back into the ground. The crawler vehicle described above can break up such corn stubble prior to discing so as to achieve a more thorough discing. Further, this can be done all at once if the vehicle tows a disc through the field.

It has further been observed that since the shoes 14 are carried by conventional track links 13, shoes 14 can be employed together with conventional shoes of the type used on track-type tractors. For example, shoe 14 can be alternated with a standard shoe as desired at the expense of a commensurate loss in function and efficiency.

According to one method of operation, after first reducing debris material in size, tracks 11, 12 can be driven in opposite directions onto the debris and in this manner virtually "screw" the material into the ground.

Claims

1. A crawler vehicle for use in compacting a fill of earth and debris, the vehicle being of a type supported by spaced parallel endless tracks in which the tracks include a plurality of articulated links (13) supporting track shoes (14), characterized by said shoes each comprising a broad, rigid plate (17) having top and bottom surfaces (18,19), a substantial region of the bottom surface (19) acting as a tread surface for engaging the ground, a relief opening (21) formed to extend centrally through said tread surface, said opening being sufficiently large to readily pass fill materials outwardly therethrough to inhibit buildup of impacted materials on the back side of said track shoes, a pair of grouser blades (22) and a pair of demolition blades (29) carried to protrude generally normal to said tread surface of said track shoes, said demolition and grouser blades being disposed to define escape channels (38,39) for readily permitting material discharged from said opening to freely leave the track shoe.

2. A crawler vehicle according to Claim 1 characterized in that said pair of grouser blades (22) respectively extend along a substantial portion of the leading and trailing edge margins (26,27) of said tread surface, said grouser blades being mutually offset laterally to opposite sides of the centerline of the path of movement of the track shoes, and said pair of demolition blades (29) extend diagonally substantially in parallel relation respectively from the leading and trailing edge margins of said tread surface toward said trailing and leading edge margins for demolishing debris, said demolition blades being spaced from said grouser blades to define said channels for passing the material discharged from said opening free of said track.

3. A track shoe for a vehicular crawler track of a type for crushing, breaking, grinding and compacting a fill of earth and debris materials, characterised by said shoe comprising a broad, rigid plate (17) having top and bottom surfaces (18,19), a substantial region of the bottom surface acting as a tread surface for engaging the ground, a relief opening (21) formed to extend centrally through said tread surface, said opening being sufficiently large to readily release fill materials outwardly therethrough to inhibit buildup of impacted material behind said track shoe, a pair of grouser blades (22) protruding generally normal to said tread surface and respectively extending along a substantial portion of the leading and trailing edge margins (26,27) of said tread surface, said grouser blades being mutually offset laterally to opposite sides of the centerline of the path of movement of the track shoes, first and second demolition blades protruding generally normal to said tread surface and extending diagonally respectively from the leading and trailing edge margins of said tread surface toward said trailing and leading edge margins, said demolition blades being spaced from said grouser blades to define gaps therebetween serving to channel the material released from said opening free of said shoe.

4. A track shoe for a vehicular crawler track for crushing, breaking, grinding and compacting land fill materials, characterised by said shoe comprising a broad rigid plate (17) having top and bottom surfaces (18,19), a substantial region of the bottom surface acting as a tread surface for engaging the ground, first snd second demolition blades (28,29) protruding generally normal to the plane of said tread surface and respectively extending diagonally from the leading and trailing edge margins 926,27) of said tread surface toward said trailing and leading edge margins for demolishing debris and solid waste materials.

5. In a crawler vehicle for use in compacting fill materials of earth, debris, solid or liquid waste, the vehicle being of a type supported by spaced parallel endless tracks in which the tracks include a plurality of articulated links, said links supporting track shoes, characterised by said shoes comprising a broad, rigid plate having top and bottom surfaces (18,19), a substantial region of the bottom surface acting as a tread surface for engaging the ground, an opening (21) formed centrally of said tread surface and extending through said shoe for passing material therethrough from behind said shoe and inhibiting buildup of impacted fill materials behind said shoe, the region of said tread surface having leading and trailing edge margins (26,27) extending transversely of the path of the track associated with the shoe,

grouser blade means (22,23) protruding generally normal to said tread surface and extending from an end of one of said edge margins along a substantial portion thereof and terminating sufficiently short of the other end of said one edge margin to define a gap therebetween for fill materials to pass therethrough, said grouser blade means being offset laterally with respect to the center line of the path of movement of the track shoes, demolition blades means (28,29) protruding generally normal to said tread surface and extending diagonally from said edge margin occupied by said grouser blade means toward the other said edge margin, said demolition blade means being disposed to direct fill materials toward said gap to be freely discharged from behind said shoe.

6. In a crawler vehicle for use in compacting fill materials of earth, debris or waste, the vehicle being of a type supported by spaced parallel endless tracks in which the tracks include a plurality of articulated links, said links supporting track shoes, characterised by said track shoes comprising a rigid plate (17) having top and bottom surfaces (18,19), a substantial region of the bottom surface acting as a tread surface for engaging the ground, a central opening (21) formed to extend through said plate, a pair of grouser blades (22,23) and a pair of demolition blades (28,29) said grouser blades lying substantially normal to the underside of the shoe and the path of the tracks while the demolition blades lie substantially normal to the underside of said shoe but at a substantial angle to the path, both of said grouser blades extending part way across the width of said shoe and substantially offset to opposite sides of the center line of the path of the track, the displacement between the laterally inner end of each said grouser blade and an associated side edge of said rigid plate including a gap defined between said end of said grouser blade and a portion of one of said demolition blades, each said demolition blade being disposed to lie mainly behind its associated said gap and in the path of fill materials emerging from said central opening said demolition blades serving to direct fill materials via said gap.

7. In a crawler vehicle of a type supported by spaced, parallel endless tracks for use in compacting fill materials of earth, debris, trash and the like, said endless tracks including a plurality of articulated links, track shoes carried by said links, characterised by some of said shoes having top and bottom surfaces (18,19) wherein a substantial region of the bottom surface (19) serves as a tread surface for engaging the ground, a pair of grouser blades (22,23) carried by said tread surface extending substantially normal to the path of its associated track, said grouser blades being spaced apart along said path, demolition means (28,29) carried by and protruding from said tread surface, said demolition means being disposed to substantially continuously support said shoes in the region extending between said grouser blades as the shoe progressively engages the ground to enhance stability of said track.

8. In a crawler vehicle of a type supported by spaced, parallel endless tracks for use in compacting fill materials of earth, debris, trash and the like, according to Claim 7 in which the last named means includes a pair of demolition blades (28,29) carried to protrude from said surface and extend diagonally of said path, an end of each of said demolition blades invading the plane of an associated grouser blade, the other end of each of said demolition blades extending substantially through an imaginary plane common to each of said other ends, said imaginary plane being disposed substantially normal to said path and intermediate said pair of grouser blades.

FIG_1

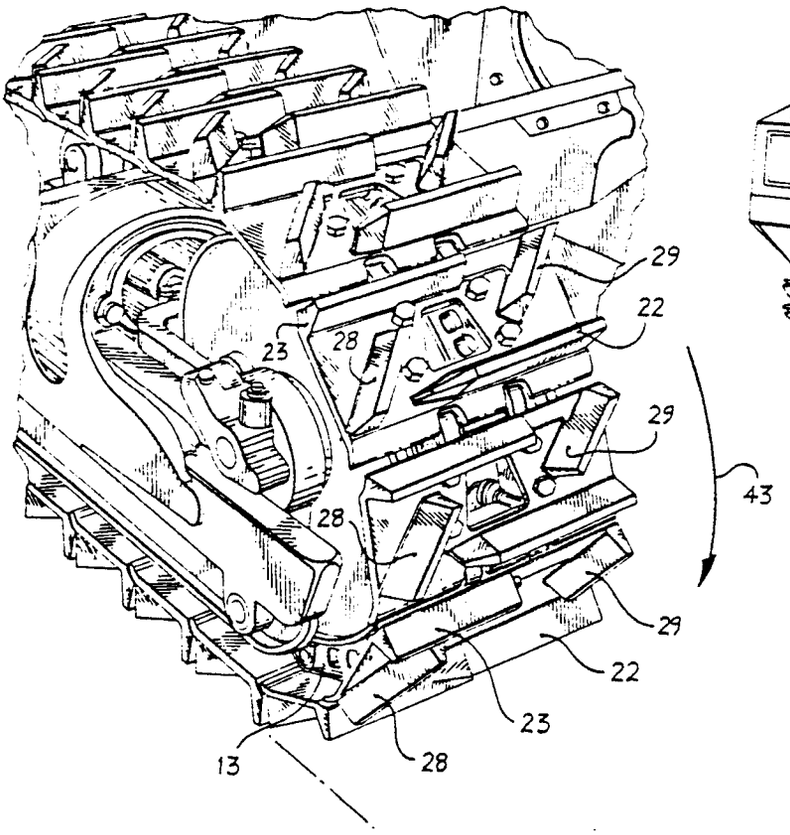


FIG_2

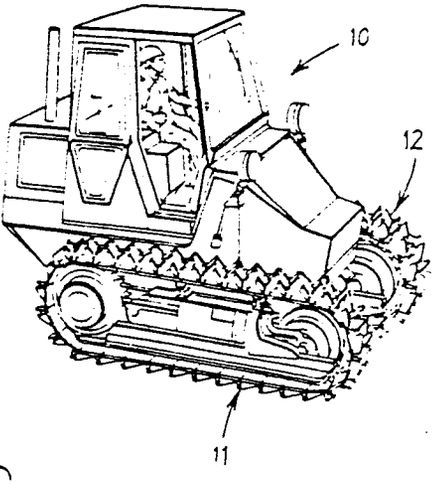


FIG_3

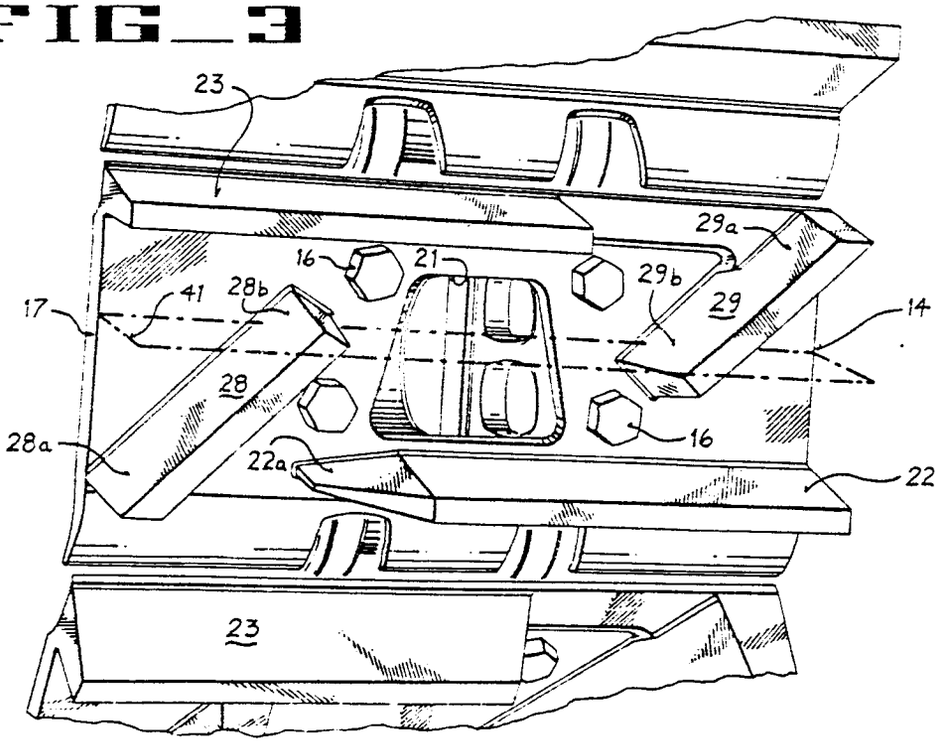


FIG_4

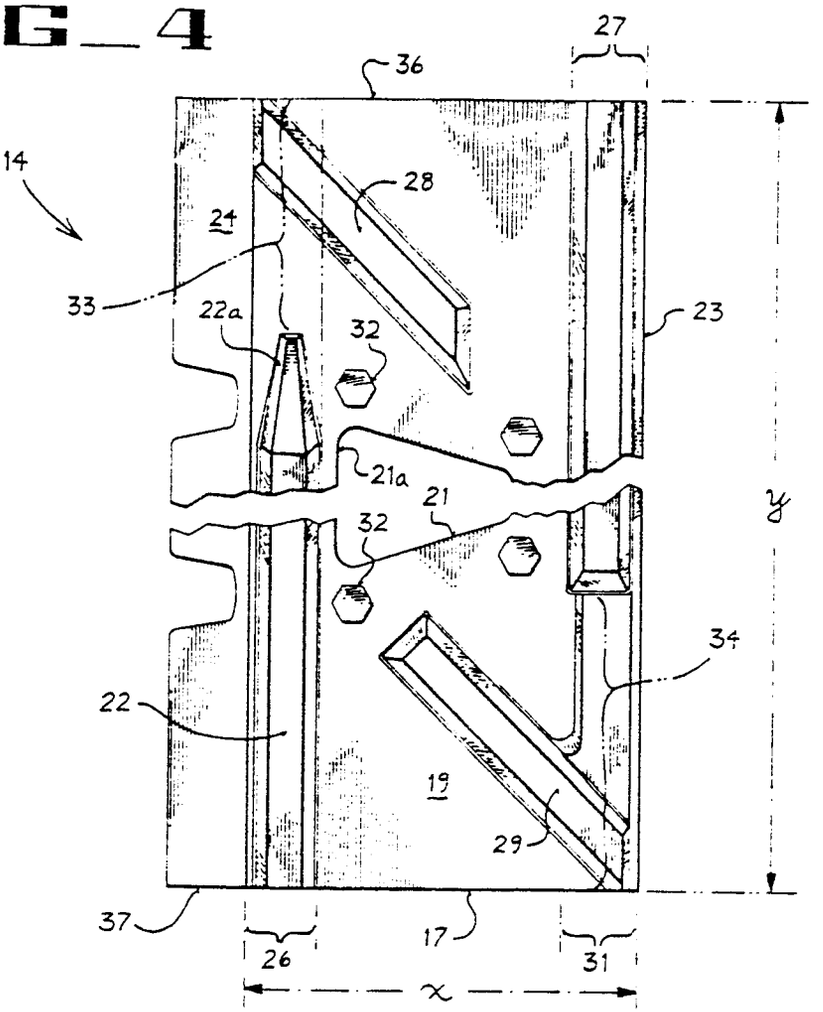


FIG_5

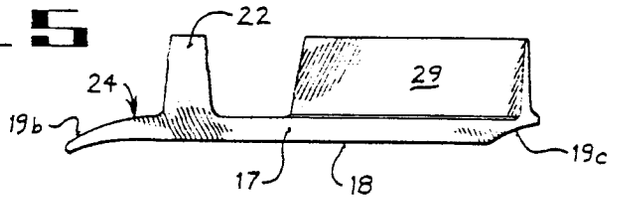


FIG_6

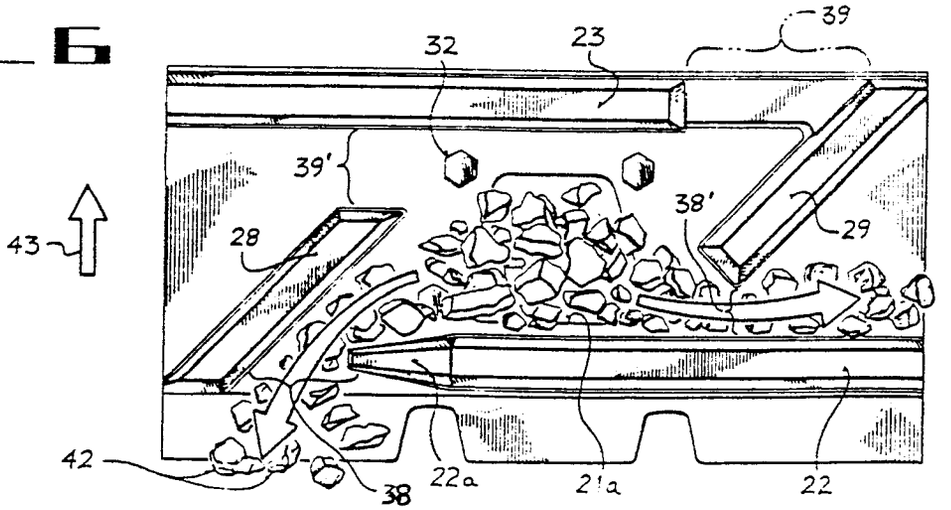
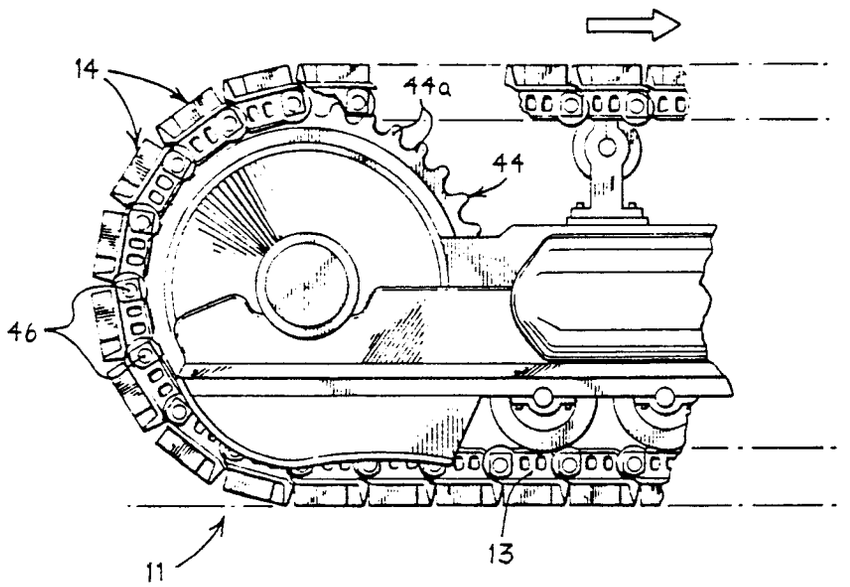


FIG_7



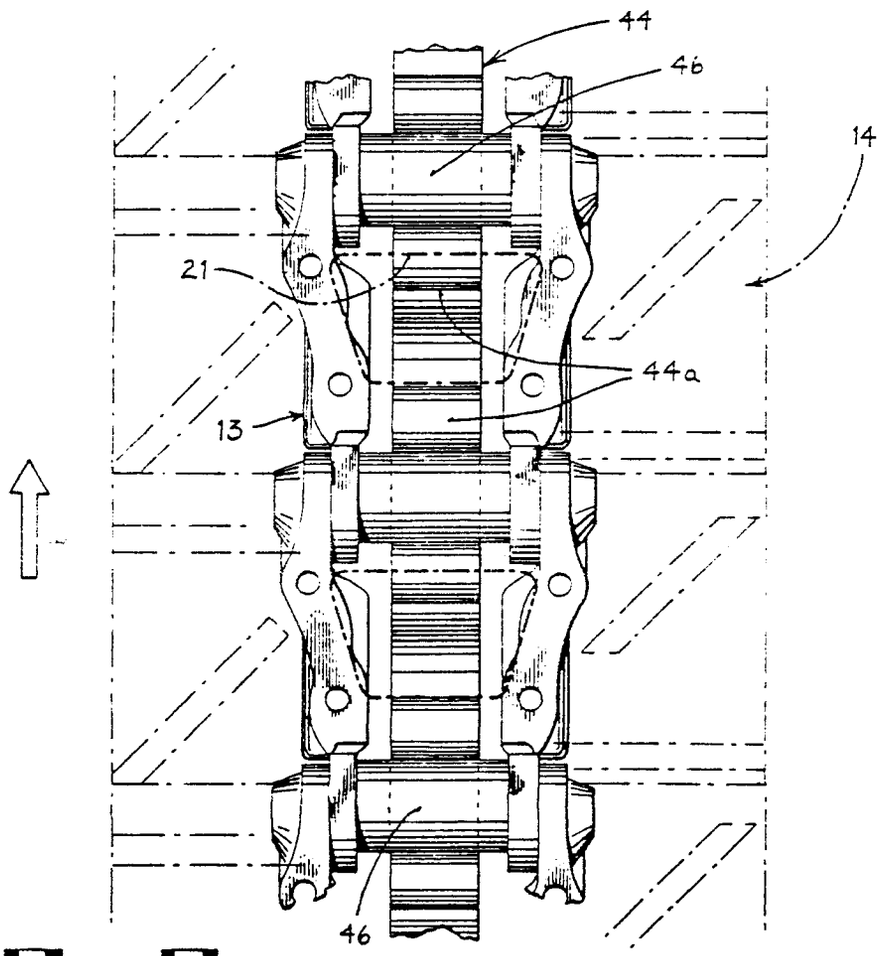


FIG_8