PATENT SPECIFICATION (11) 1 593 573

1 593 573

(21) Application No. 14284/78 (22) Filed 12 April 1978 (19)

(31) Convention Application No. 7 704 263 (32) Filed 14 April 1977 in (33) Sweden (SE)

(44) Complete Specification published 22 July 1981

(51) INT. CL.³ A01B 29/00

(52) Index at acceptance A1B UFT

(54) IMPROVEMENTS IN OR RELATING TO TRACTOR-TOWED RING ROLLERS

(71) I, KARL GUSTAV CRISTER STARK a Swedish Citizen of Väderstad Herrgård, S-59021 Väderstad, Sweden do hereby declare the invention, for which I pray that a Patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to ring rollers for towing by a tractor, said rollers being of the kind including a middle section and at least two outboard sections on either side of the middle section.

Generally the outboard sections are connected to the middle section in such a way that they may be folded upwardly to a mainly vertical position. The middle section is normally provided with at least one transport wheel for use when the roller is transported, e.g. on a road. The rolls of each section are normally arranged on a common shaft, the two ends of which are each rotatably journalled at the lower end of a downwardly dependant arm, the upper end of said arm being connected to a structure forming part of said section, said structure generally being in the form of a lattice frame.

The frame and arms of each section are normally attached to an adjacent section or sections by articulated joints such as hinges, thereby providing for an adjustable angled interrelationship between said sections. It has proved difficult to arrange for the rolls closest to a hinge, to follow the irregularities of uneven ground. Thus, some parts of the soil tend not be rolled, or rolled too loosely.

An object of this invention is to provide an arrangement for such rollers which will not suffer from this disadvantage.

According to this invention, there is provided a ring roller intended to be towed by a tractor and of the kind including a middle section and at least two outboard sections on either side of the middle section which can be folded upwardly, and in which the rolls of at least each outboard section are arranged on a common shaft, the ends of which are supported by the lower ends of a pair of support arms extending at an oblique angle downwardly from a support frame of the section, characterized in that the arms are so mounted in their respective support frame that their respective ends are allowed a limited arcuate up and down movement in relation to the support frame for allowing the shaft and its rolls to adapt to the irregularities of the ground irrespective of the relative angular relationship of the sections.

Preferably, at least one of the two arms carrying the shaft is resiliently and pivotably connected to the frame.

Alternatively, the arm may be formed with a low torsional resistance, or may be in the form of a leaf spring.

Conveniently, the frame may be made from a single tube, preferably of quadratic cross section, to the ends of which the arms are attached by means of rubber elements.

In order that the invention will be readily understood and further features made apparent, embodiments thereof will now be described with reference to the accompanying drawings, in which:–

Figure 1 is an end view of one embodiment of a ring roller according to the invention, showing a frame, arm and shaft with rolls,

Figure 2 is an end view of another embodiment of a ring roller according to the invention, wherein the arms are in the form of leaf springs, and,

Figure 3 is a perspective view of the ring roller.

Referring to Figure 3 of the drawings, the ring roller is intended to be coupled to a prime mover, e.g. a tractor, and comprises a middle section 10 and two outboard sections 11 arranged one on each side of the middle section 10. The sections 11 are so articulately connected to the middle section 10 that they may be swung upwardly for transport, the middle section 10 being provided with at least one pair of transporting wheels 9 that may be lowered, for example, by a hydraulic cylinder controlled from the tractor, for raising the roller with respect to the ground.

The middle section 10, as well as the outboard sections 11 are provided with a plurality of closely spaced metal rolls 1, preferably of cast iron, mounted on a common shaft 2, the ends of which are rotatably journalled in

bearings 5 (see Figs. 1 and 2) at the lower ends of supporting arms 3. The arms 3 are attached to a support frame 4 (see Figs. 1 and 2) at their upper ends and angularly depend from the frame 4 and support their respective shafts 2 substantially horizontal in operation of the roller.

In Figure 1, the arm 3 shown has the form of a rigid member. To make it possible for its shaft 2 to move in different angular directions with respect to the frame 4, each pair of arms 3 is resiliently and pivotably mounted on its respective frame member 4 by means of rubber elements.

Preferably, each arm 3 of the pair is provided with a square section stub axle 3*a* and each stub axle is located in its respective end of a tubular square-section frame member which is of larger square section than the stub axles. Also the stub axles 3*a* are angled with respect to said frame member (as shown in Figure 1) to leave corner spaces within each of which an elongated rubber element 6 is mounted so as to be in compression. Such an arrangement enables the arms 3 complete freedom to adjust independently of each other to different angular positions if their respective common shaft 2 deviates from the horizontal in use, i.e. if it has to tilt at an angle to the horizontal to follow a slope in the ground.

The resilience provided by the rubber elements 6, also makes it possible for the arms 3 to turn a small amount about their longitudinal axes. Each arm 3 may also be slightly rotatable about its longitudinal axis, by means of a rubber cushion 8 vulcanized to two steel plates 7. Alternatively, as shown in Figure 2, each arm 3′ may be in the form of a leaf spring acting in torsion which is a distinguishing feature of the invention, but in this case the more "linear" portion of the spring arm 3′ twists, in use, to absorb the torsional deflection caused by the angular deviation from the horizontal of the shaft 2.

The invention is not limited to the embodiments described and illustrated in the drawings but other embodiments may also be conceived within the scope of the following Claims.

WHAT I CLAIM IS:–

1. A ring roller intended to be towed by a tractor and of the kind including a middle section and at least two outboard sections on either side of the middle section which can be folded upwardly, and in which the rolls of at least each outboard section are arranged on a common shaft, the ends of which are supported by the lower ends of a pair of support arms extending at an oblique angle downwardly from a support frame of the section, characterized in that the arms are so mounted in their respective support frame that their respective shaft ends are allowed a limited arcuate up and down movement in relation to the support frame for allowing the shaft and its rolls to adapt to the irregularities of the ground irrespective of the relative angular relationship of the sections.

2. A ring roller according to Claim 1, characterized in that at least one of the pair of arms carrying a shaft is arranged to allow a limited pivoting movement in a vertical plane through the arm, and in that both arms are mounted and arranged so that they can take up angular displacement caused by the shaft deviating from the horizontal.

3. A ring roller according to Claim 2, characterized in that one or each arm of a pair is formed by two stiff end portions joined by a rubber element vulcanized between two steel plates each of which being attached to an end portion of the arm.

4. A ring roller according to any one of Claims 1 to 3, characterized in that the support frame of a section is formed by a single straight tubular beam.

5. A ring roller according to any one of Claims 1 to 4, characterized in that the arms of each pair of arms are formed as rigid members, their upper ends being pivotably and resiliently mounted to the support frame by means of rubber elements, and in that the resiliency in the mounting enables the arms to turn slightly relative to their longitudinal axis.

6. A ring roller according to Claim 5 when dependant on Claim 4, characterized in that the tubular beam is of hollow rectangular cross section and in that each arm is mounted in an end of the beam via a shaft of smaller rectangular dimension, and in that elongated rubber elements are located in each end of the beam and arranged so as to act in compression on their respective shaft.

7. A ring roller according to any one of Claims 1 to 4 characterized in that each arm is formed as a leaf spring the ends of which are fixedly connected to the support frame and a bearing of its shaft respectively.

8. A ring roller constructed, arranged and adapted for use substantially as hereinbefore described with reference to Figures 1 and 3 or Figures 2 and 3.

SOMMERVILLE & RUSHTON,
Chartered Patent Agents,
89 St. Peters Street,
St. Albans,
Herts. AL1 3EN.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1981. Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1593573 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale

Fig. 1

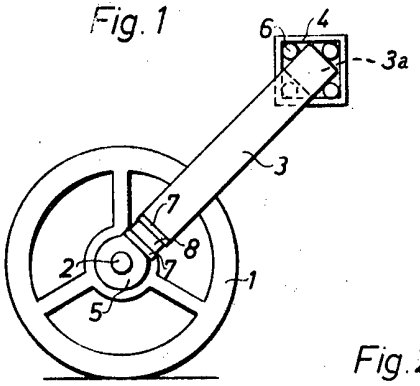

Fig. 2

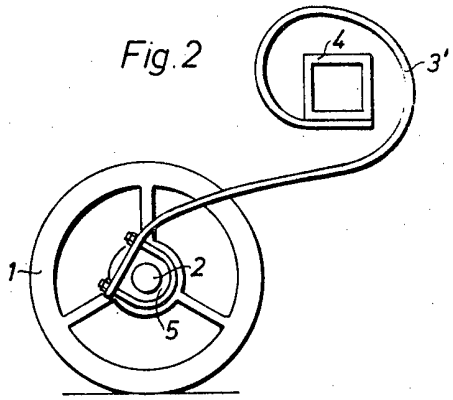

Fig. 3