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Description

[0001] The present invention relates to a mowing machine for mowing agricultural leaves and stalks according to the preamble to Claim 1. In practice, such mowing machines are known in numerous embodiments. For this purpose the mowing device of the mowing machine can be guided at the side of the agricultural carrier vehicle over the surface of the field or meadow area, whereas for transporting the mowing machine by road, the mowing device is brought into a transport position in which the mowing device extends substantially vertically approximately above its support device. In today's agriculture, which uses large working widths, so-called triple combinations are also known with which, on an agricultural carrier vehicle, a front mower first of all works the track covered by the carrier vehicle and then two further mowing units disposed in the rear section of the carrier vehicle create two further mowing tracks at the side next to the mowing track of the front mower.

[0002] A mowing machine of the type described above is disclosed in DE 101 49 364 A1 and comprises a mowing device which, in the work and operating position, can be guided at the side of an agricultural carrier vehicle in order to mow agricultural stems and leaves over a field or meadow area. For attachment to a three-point lifting device of the agricultural carrier vehicle the mowing machine has a three-point attachment device wherein, on the side of the three-point attachment device facing away from the mowing device, the articulation point for receiving a lower link of the three-point lifting device is made to be flexible. This flexible configuration serves to prevent collisions with stones in the ground or similar obstacles. One shortcoming of this mowing device is that there are no possibilities for adjusting the distance of the mowing device from different carrier vehicles.

[0003] It is therefore the object of the invention to propose a mowing machine with which the shortcomings of the prior art are avoided and so, associated with the least possible structural complexity, reliable collision prevention and effec-

tive possibilities for adapting the mowing machine to different agricultural carrier vehicles are provided.

[0004] According to the invention this object is achieved by the characterising
5 features of Claim 1. Advantageous further developments of the invention are the subject matter of the other claims.

[0005] According to the invention a mowing machine having at least one mow-
ing device which is guided in a work and operating position at the side of an ag-
10 ricultural carrier vehicle is proposed which comprises a number of cutting ele-
ments, each of which rotates around an approximately vertical axis, and having
a support device having articulation points attached thereto for attaching to a
three-point lifting device of the agricultural carrier vehicle, at least one support
arm being articulated to the support device, which support arm, when in the
15 work and operating position, extends approximately transversely to the travel
and work direction, on which support arm the mowing device is pivotally mount-
ed and by means of which support arm a position of the mowing device can be
changed from a work and operating position, which is approximately parallel to
the ground and guided at the side of a carrier vehicle, into an approximately ver-
20 tically orientated transport position, at least one of the articulation points as-
signed to the support device being connected to the support device so as to be
flexible out of a starting position in a direction corresponding to the travel and
work direction, and the starting position of at least one of the articulation points
assigned to the support device being for its part formed so as to be adjustable
25 in or counter to the travel and work direction relative to the support device.

[0006] By means of this design according to the invention of at least one of the
articulation points of the support device the user of such mowing devices is en-
abled to adapt, with minimal structural complexity, the mowing machine to dif-
30 ferent agricultural carrier vehicles, said machine taking different geometries of
the three-point lifting device or also different tyre sizes into account, and so,
consequently, effectively prevents the mowing device from colliding with stones
in the ground or similar obstacles. When attaching these types of mowing ma-

chine, in particular when a mowing device is provided on both sides of the support device, it is particularly important for the mowing machine to be moved as close as possible to the rear contour of the carrier vehicle in its attached position so that the effect of the weight of the mowing machine upon the axle loads of the carrier vehicle is kept small. Simple embodiments of the invention can be based here upon a translatory adjustment of a receiving pin of the articulation points of the support device in or counter to the travel and work direction of the mowing machine. However, it is also conceivable for this adjustment to be made by means of a linkage arrangement that can be changed by a pivot movement.

[0007] In one advantageous embodiment the linkage arrangement for this purpose consists of a lower linkage which forms the flexible connection between the articulation point for a lower linkage of the three-point lifting device and the support device of the mowing device. In one embodiment, with a mowing device on each of the two sides of the support device each linkage arrangement with the respective articulation point includes a flexible connection so as to prevent collisions with stones or similar obstacles. A further linkage of the linkage arrangement serves to hold the receiving pin for receiving a lower linkage of the three-point lifting device. For this purpose the further linkage on the side of the support device facing the carrier vehicle is suspended pivotally in a holder of the support device. In the event of a mowing device being damaged, for example by a stone projecting out of the ground, it is made possible by the contact of the mowing device with the stone, due to the effect of the flexible connection of the lower linkage of the linkage arrangement, for the mowing device to be pivoted backwards counter to the travel and work direction, and so to avoid the obstacle. This flexible support can be regulated by the influence of the energy of an energy accumulator, for example a spring. In advantageous embodiments a holding force is predetermined so that only when this holding force is exceeded can a flexible extension of the lower linkage of the linkage arrangement occur. In relation to the adaptation of the distance between the mowing device and the rear contour of the agricultural carrier vehicle, in order to lock the lower linkage of the linkage arrangement beneath the support device, a holder with a plurality

of holes is provided so that by fitting the lower linkage in one of the holes, an adjustment can be made to the distance between the receiving pin of each articulation point and the support device of the mowing device.

- 5 [0008] In one advantageous further development of the invention, provision can be made such that the further linkage of the linkage arrangement is configured as regards its pivotable attachment to the support device of the mowing device such that the pivot axis of the further linkage is orientated at an angle to the respective other articulation point on the support device. This configuration
10 facilitates the pivoting motion of the mowing device backwards during the evasive manoeuvre with respect to a stone or similar obstacle.

[0009] The invention is now to be described in more detail by means of an exemplary embodiment:

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[0010] The drawings show as follows:

Fig. 1: a perspective, partially dismantled view of a mowing machine according to the

- 20 invention with a mowing device guided at the side of the track of an agricultural carrier vehicle;

Fig. 2: a perspective, partially dismantled view of the mowing machine according to Fig. 1;

25

Fig. 3: a front view of a mowing machine according to Fig. 1.

- [0011] An exemplary embodiment of a mowing machine 1 according to the invention is illustrated in more detail in Fig. 1 and comprises a support device 2
30 for coupling the mowing machine 1 to an agricultural carrier vehicle (not shown), for example in the manner of an agricultural tractor, a support arm 3 for pivotally mounting the mowing device 4 being articulated to the left side of the support device 2 relative to the travel and work direction F of the mowing machine 1. In

this illustration the mowing device 4 is in a work and operating position guided substantially parallel to the ground at the side of the agricultural carrier vehicle. In a correspondingly mirror image position, a further mowing device 4 can be assigned to the support device so that, in co-operation with a mowing device
5 suspended in the front of the agricultural carrier vehicle, a so-called triple combination has been produced. During operation, in order to harvest grass or similar crops, the mowing devices 4 of the mowing machine 1 can be moved in a gliding manner over the surface of a field or meadow surface, cutting elements of the mowing devices 4 rotating around an approximately vertical axis
10 being provided in order to cut down the crop. The mowing device 4 can be moved from the work and operating position into a transport position including an approximately vertical extension of the mowing device 4 by changing the position of the pivotable support arm 3.

15 [0012] As can be gathered in particular from Fig. 2, the support device 2 of the mowing machine 1 comprises two linkage arrangements 5 which form the articulation points 6, 7 for receiving lower linkages of a three-point lifting device of the agricultural carrier vehicle. For this purpose each linkage arrangement 5 consists of a lower linkage 8 and a further linkage 9, the further linkages 9 being
20 suspended pivotally on a holder 10. In order to connect the mowing machine 1 to the agricultural carrier vehicle, the further linkages 9 have receiving pins 11 onto which, when attaching the mowing machine 1, lower linkages (not shown) of the three-point lifting device can be placed. In order to lock the lower linkages 8 of the linkage arrangement 5 to the support device 2, a holder 12 with a
25 plurality of holes 13 is provided beneath the support device 2, the holder 12 being able to be formed by two straps attached parallel to one another. With the above described linkage arrangement 5 disposed in the front, lower section of the support device 2 of the mowing machine 1, an apparatus is created which is characterised by a small degree of constructional, and so structural complexity,
30 and thereby performs two functions, however, in a common unit. In the event of a mowing device 4 being damaged, for example by a stone projecting out of the ground, by the contact of the mowing device 4 with the stone, due to the effect of the flexible connection of the lower linkage 8 of the linkage arrangement 5 it

is made possible for the mowing device 4 to be pivoted backwards in a direction counter to the travel and work direction F, and so to avoid the obstacle. The flexible support can be regulated by the influence of the energy of an energy accumulator, for example a spring. In advantageous embodiments a holding
5 force is predetermined so that only when this holding force has been exceeded can a flexible extension of the lower linkage 8 of the linkage arrangement 5 occur. In relation to the adaptation of the distance between the mowing device 4 and the rear contour of the agricultural carrier vehicle, in order to lock the lower linkage 8 of the linkage arrangement 5 beneath the support device 2 a holder
10 12 with a plurality of holes 13 is provided so that by fitting the lower linkage 8 in one of the holes 13, an adjustment can be made to the distance between the receiving pin 11 of each articulation point 6, 7 and the support device 2 of the mowing device 4.

15 [0013] In one advantageous further development of the invention provision can be made such that the further linkage 9 of the linkage arrangement 5 is configured, as regards its pivotable attachment to the support device 2 of the mowing device 4, such that the pivot axis 14 of the further linkage 9 is orientated at an angle to the respective other articulation point 6, 7 on the support device 2.
20 This configuration facilitates the pivot motion of the mowing device 4 backwards during the evasive manoeuvre with respect to a stone or similar obstacle.

Patentkrav

1. Slåmaskine, som har mindst én mejeindretning (4), som er ført i en arbejds- og driftsstilling på siden af et landbrugs-bærekøretøj, og som omfatter et
5 antal skæreorganer, hvor hvert skæreorgan kan rotere omkring en i hovedsagen lodret akse, og som har en bæreindretning (2) med derpå anbragte hængs-
lingssteder (6, 7) med henblik på tilslutning til en trepunkts-løfteindretning på
landbrugs-bærekøretøjet, og hvor der på bæreindretningen (2) er hængslet
mindst én bærearm (3), som i arbejds- eller driftsstillingen strækker sig tilnær-
10 melsesvis på tværs af køre- og arbejdsretningen (F), på hvilken bærearm meje-
indretningen (4) er drejeligt monteret, og ved hjælp af hvilken bærearm man kan
ændre stillingen af mejeindretningen (4) fra en arbejds- og driftsstilling, som er i
hovedsagen parallel med jorden ved siden af bærekøretøjet, og hen i en til-
nærmelsesvis lodret transportstilling, og hvor mindst ét af de til bæreindretnin-
15 gen (2) tilforordnede hængslingssteder (6, 7) – ud fra en udgangsstilling og i en
til køre- og arbejdsretningen (F) svarende retning - er eftergiveligt forbundet
med bæreindretningen (2), **kendetegnet ved, at** udgangsstillingen for mindst ét
af de til bæreindretningen (2) hørende hængslingssteder (6, 7) – i forhold til bæ-
reindretningen (2) – er således valgt, at den kan justeres i eller imod køre- og
20 arbejdsretningen.

2. Slåmaskine ifølge krav 1, **kendetegnet ved, at** mindst ét af de til bæreind-
retningen (2) hørende hængslingssteder (6, 7) er eftergiveligt forbundet med
denne bæreindretning (2), og at udgangsstillingen for i det mindste ét af de til
25 bæreindretningen (2) hørende hængslingssteder – i forhold til bæreindretningen
(2) – kan bevæges i eller imod køre- og arbejdsretningen (F).

3. Slåmaskine ifølge krav 1, **kendetegnet ved, at** mindst ét af de til bæreind-
retningen (2) hørende hængslingssteder (6, 7) er forbundet med nævnte bære-
30 indretning (2) på en sådan måde, at det er fleksibelt fra en startstilling og i en
retning, som svarer til bevægelses- og arbejdsretningen (F) – dog kun når en i
forvejen bestemt holdekraft er overskredet, idet udgangsstillingen for mindst ét
af bæreindretningens (2) hængslingssteder (6, 7) selv er således udformet, at

den - i forhold til bæreindretningen (2) - kan justeres i eller imod bevægelses- og arbejdsretningen (F).

4. Slåmaskine ifølge ethvert af kravene 1 til 3, **kendetegnet ved, at** både den bevægelse, som er et resultat af den eftergivelige forbindelse ved mindst ét af bæreindretningens (2) hængslingssteder (6, 7) – og den bevægelse, som udgangspositionen for mindst ét af hængslingsstederne (6, 7) kan udføre, er en translatorisk bevægelse.

5. Slåmaskine ifølge krav 1 til 3, **kendetegnet ved, at** både den bevægelse, som er et resultat af den eftergivelige forbindelse ved mindst ét af hængslingsstederne (6, 7) ved bæreindretningen (2) og den bevægelse, som er et resultat af en justering af udgangsstillingen af mindst ét af hængslingsstederne (6, 7) – er udført som en drejebbevægelse.

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6. Slåmaskine ifølge krav 1 til 5, **kendetegnet ved, at** mindst ét af hængslingsstederne (6, 7) er udført som en hængselindretning (5).

7. Slåmaskine ifølge et af kravene 1 til 6, **kendetegnet ved, at** mindst ét af hængslingsstederne (6, 7) er udformet som en hængselindretning (5), hvor et nedre hængselorgan (8) danner en eftergivelig forbindelse til bæreindretningen.

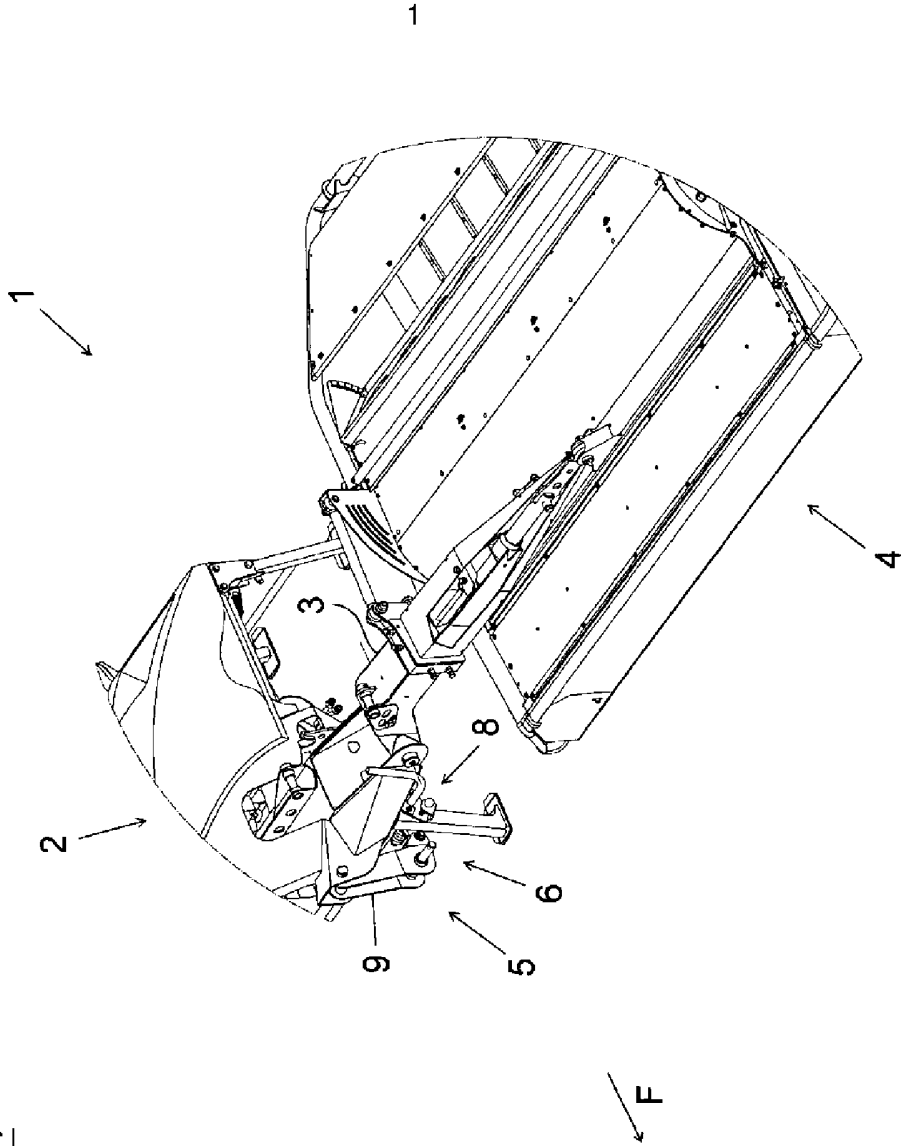
8. Slåmaskine ifølge krav 7, **kendetegnet ved, at** det nedre hængselorgan (8) i hængselorgan-indretningen (5) kan arreteres i en holdeindretning (12) med et antal borede huller (13).

9. Slåmaskine ifølge et af kravene 6 til 8, **kendetegnet ved, at** hængselorgan-indretningen (5) har et yderligere hængselorgan (9), som har en modtagelsestap (11) til modtagelse af et under-hængselorgan i en trepunktsløfteindretning.

10. Slåmaskine ifølge krav 9, **kendetegnet ved, at** det yderligere hængselorgan (9) i hængselorgan-indretningen (5) er hængslet til et holdeorgan (10) ved

den mod bærekøretøjet vendende side af bæreindretningen (2), og at en drejeakse (14) hørende til det yderligere hængselorgan (9) nogenlunde skærer det område, hvor en modtagelsestap (11) på det andet hængslingssted (6, 7) befinder sig.

Fig. 1



2

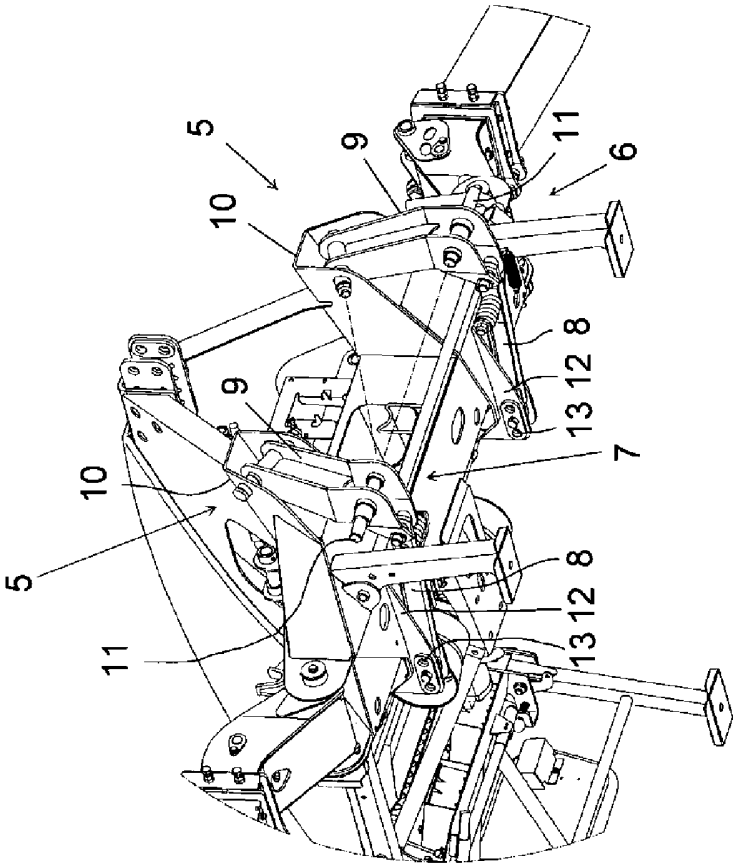


Fig. 2

Fig. 3

