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AN ORIGINAL SOLUTION FOR THE GROUND SUPPORT MECHANISM OF COMPACT LOADERS

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ABSTRACT

This paper presents constructional solution adoption draftworking gear, loader IC 04, assure existence every tyre, reaction non-vanishing. The evidence profitability solution suspension draft.

1. Introduction

Compact loaders are small – sized multifunctional equipments used constructions, agriculture, wood industry, urban management, harbour activities etc.

The characteristic of these equipments is the structure of the motion mechanism, resistance structure and the achievement of maneuverability function.

The structure of the motion mechanism is determined by the hydraulic system, final mechanical transmission type and by the connection between the wheels and the chassis.

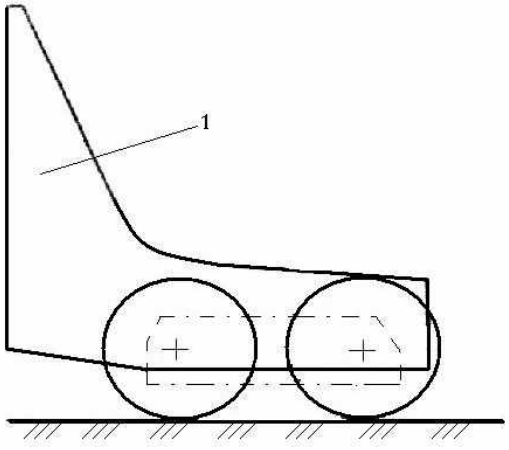
The resistance structure must ensure the quick, simple mounting and demounting of the assemblies and sub-assemblies, easy access for maintenance and to possess high rigidity.

The stable positioning on the ground of the loader presupposes the realization of a three-point ground support resistance structure (the points being either direct or indirect).

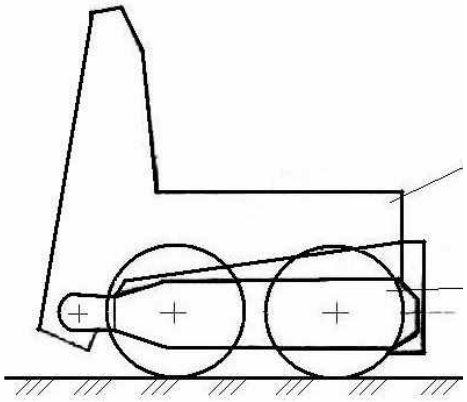
For the compact loaders, the maneuverability function is achieved through controlled skidding.

2. Presentation of the constructive solution

The maneuverability and stability of the compact loader are determined by the connection system between the wheel and the resistance structure, known as the ground support system. In fig.1 are represented two resistance structures with the manner of support and the influence of the road dislevelment on the machine motion mechanism. The resistance structure, monobloc type with 4 direct ground support points (fixed mounted wheels on the sides of the chassis) is reproduced in fig. 1.a. In this case the machine is not touching the ground with all 4 wheels.



a)



b)

Figure 1

In fig. 1.b. is reproduced the resistance structure in modular construction adapted to IC 04 loader. The adopted solution ensures the existence of a different of zero ground reaction on each tire. From the analysis of the constructive schemes presented in fig. 1one may deduct two main displacement mechanisms:

- displacement mechanisms characterized by a rigid connection between wheels and chassis, where the lifting off the ground of a wheel on a dislevelment of the railway produces the temporary loss of contact between ground and one of the wheels ;
- displacement mechanisms where the wheels are linked through a suspension mechanism independent from the chassis and the change in the position of a wheel does not influence the position of the other wheels.

The modular construction of the displacement mechanism comprises a suspension that eliminates the disadvantages of the compact solution.

The two modules of the displacement mechanism are identical and positioned symmetrically against the median plane of the equipment (fig.2).

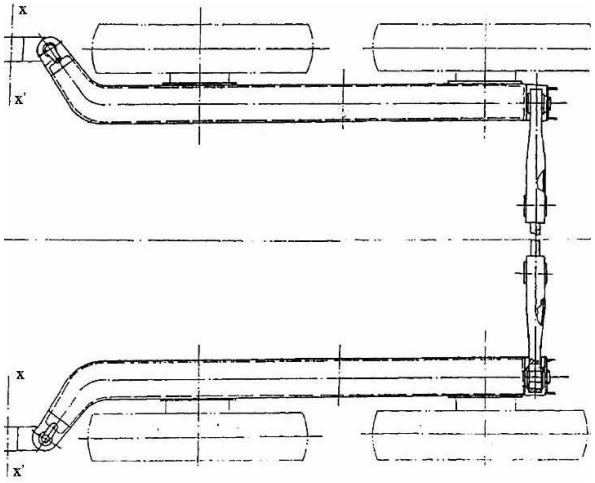


Figure 2

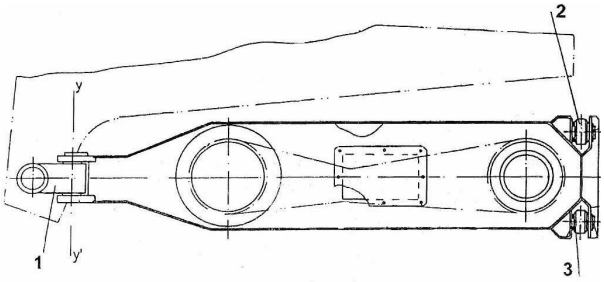


Figure 3

The suspension is composed of three main items: mechanism housing, connection system and the adjustment device.

The mechanism housing (fig.3) is articulated at the posterior side through connection 1, to the chassis, and at the anterior side it is articulated at balancer 2 and adjusting device 3.

The connection system (fig.4) is composed of 2 balancers, one articulated at the chassis,

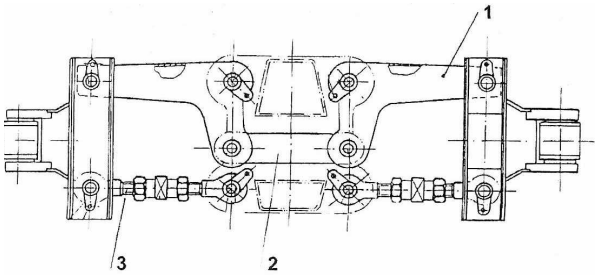


Figure 4

synchronized through strap 2 and adjusting device 3.

The adjusting device from fig.3 is used to calibrate the quadrilaterals of the suspension and achievement of the kinematics of the mechanism and is composed of threaded rods connected through a threaded sleeve secured with counter nuts. One edge of the adjusting device endowed with spherical articulations is attached to the case of the displacement mechanism, and the other end which has got cylindrical articulations, is connected to the chassis of the equipment.

The functions the suspension has to fulfill are:

- ensure proper motion transmission in the case the wheels take over the ground dislevelment
- ensure the transmission of the efforts occurring in the loading – moving, turning stages
- achievement of cinematic parameters 9rotation around x – x and y – y axes) so as to always maintain a perpendicular position against the ground of the displacement mechanism casing, and of the tires respectively.

3. Conclusions

On the basis of the results obtained during the testing of the prototype, the influence of the suspension over the traction has been highlighted, when the equipment is working on raw terrain. The analysis revealed some advantages of the adopted constructive solution, which are materialized in the following conclusions:

- Suspension mechanism cancels the wheel deviation angle from the vertical plane, when

passing over the dislevelments, of the ground so as to ensure maneuverability and stability to the equipment.

-The maintenance of the permanent contact of all wheels with the ground, regardless of the position and kind of the dislevelments, ensures the full transmission of the traction force.

-The tilting of the longitudinal axis of the chassis in vertical plane is reduced and in the case of bigger dislevelments the correlation of the suspension levers' dimensions is required.

-By imposing the dimensional characteristics of the equipment and the necessary power to the driving motor one may determine the forces that occur between the wheels and the ground, taken over by the suspension, and the reactive moments the chassis is transmitting.

4. References

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