ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 9, Issue 10 , October 2022

Requirements for Cotton Tractors and the Improvement of their Designs

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ABSTRACT. This article presents the structure and working principle of the front axle, which enables the four-wheel universal tractor to change from a low-clearance state to a high-clearance state.

KEY WORDS: tractor, front axle, clearance, permeability, stability, wheel, hammer, brus, half-frame**.**

I.INTRODUCTION

Today, the demands placed on universal cotton tractors in cotton farming are different, and in order to meet these demands, tractors must have a number of operational qualities that describe their work efficiency in these conditions.

In cotton farming, the operational qualities of universal-cutter tractors are divided into three main groups: agrotechnical, technical-economic and general technical.

Agrotechnical qualities describe the flexibility of the cotton tractor to fulfill technological requirements based on the working conditions and reflect a number of characteristics related to the agrotechnical mobility and maneuverability of the machine tractor units (MTA) created on its basis, as well as the tractor itself.

The technical and economic qualities are mainly determined by the productivity and economy of the MTA organized on the basis of the cotton tractor, which depend on the mode of aggregation in a particular situation.

General technical requirements are mainly related to the ease of work of the machinist-operator, maintenance and safe working conditions.

3- and 4-wheeled universal tractors, which are widely used in cotton farming, cannot fully meet these requirements.

II.METHODS

The high agrotechnical passability of the 3-wheeled universal-chop tractor provided it with the status of the main power tool for the mechanization of field work in cotton growing until recently. But tractors of this type have certain special disadvantages, namely [1]:

- low transverse stability, which makes its operation at a speed higher than 12-13 km/h on slopes and turns dangerous;
- negative man-made impact on the soil, this wheel is characterized by their increased coverage coefficient (3 tracks instead of 2) and the high compacting effect of vertical loading, which is distributed by 3 instead of 4 wheels;
- overloading of tires, mainly the front steered wheel of the tractor with its vertical loads;
– non-rational distribution of masses along tractor supports;
- impossibility of use in transport works due to low stability;
- it is not required in the agricultural industry for almost 4-5 months (from November to March), which is a regulated (intended, defined) low annual loading only for the season of cotton bush work;
- The use of a 3-wheeled tractor makes it impossible to fully implement the advantages of comprehensive MTAs due to the lack of traction-working potential of the tractor and the environmental impact on the soil significantly exceeding the permissible standards.

To some extent, the disadvantages listed above are not present in 4-wheel tractors. Reduction of the negative man-made impact on the soil (by 33.3%) due to the reduction of the total covering surface of the wheel tracks, reduction of the maximum pressure on the soil in the area of the base surface of the walking apparatus, good rational distribution of MTA masses on the axles and reduction of wheel rotation are the advantages of these tractors compared to 3-wheeled tractors. . But their turning radius is large and the agrotechnical slot under the front bridge is not enough, so they are not

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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used for interrow cultivation of cotton crops. Row intercropping is the most labor-intensive technological operation in cotton farming.

Based on the technology of processing the cotton bush, the main requirements for new generations of 4-wheel cotton tractors are to maintain the good qualities of 3-wheel cotton tractors, that is, to increase turning to ensure minimal loss of productive areas in the area of the turning lane at the edges of the ditch areas with cotton crops;

If the problems listed above are found in 4-wheeled tractors, then the problem of optimization of the car park and the annual loading of cotton tractors will be solved by using them not only for harvesting and transportation, but also for cotton growing, field cultivation, fodder, cattle breeding, etc. . In addition, due to the quality of devices located in the undercarriage scheme of the 4-wheeled tractor, controllability and stability are improved to the extent required by safety standards in transport operations, planting cotton seeds between rows and other works.

To solve the above problems, the most convenient is the universal-mower tractor equipped with a front bridge with a sliding elbow with an adjustable clearance [2]. It consists of a tubular steel bar hinged to the front axle 2 of the half-frame through the axle 3, and it can swing in the plane transverse to the axle (Fig. 1). On both sides of the tubular steel hammer 1 with uncut ends, sliding punches "K" attached to the pivot pin 4 are installed.

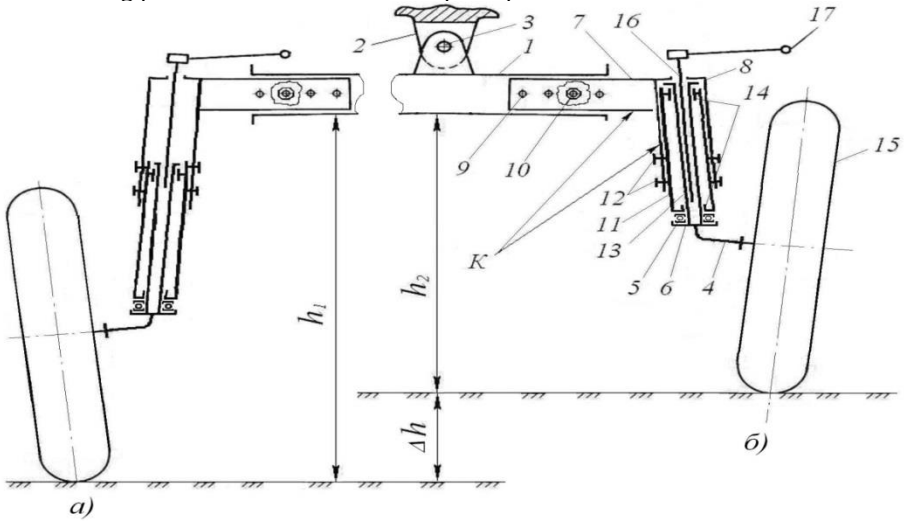

Figure 1. Scheme of the front axle of the tractor: a) high clearance b) low clearance

The turning pin has the ability to freely rotate relative to the push punch "K", which is carried out by means of the support bearing 5, which is supported on the one hand by the push punch, and on the other hand by the plate 6 of the turning pin. Each of the push punches "K" is made of hollow tubes 7 and 8 welded to each other in a G-shape. The hollow pipe 7 is telescopically connected to the tubular steel hammer 1 and has an open hole 9 on 2 sides for adjusting the width of the track on which the fixator 10 is installed, and the other hollow pipe 8 is hinged with a pivot pin 4.

For this purpose, a pipe 11 is placed telescopically in the hollow pipe 8 on the side of the turning shaft, and its position is fixed with plug bolts 12 relative to the hollow pipe 8. Inside the pipe 11, there is a slotted pipe 13, which is freely movable in bushings 14 and fixed to the guide wheel 15 tsapfasi 4 with one section. In order to facilitate turning and fix its vertical movement, the slotted pipe is mounted on one side of the plate 6, which is fixed to the shaft, and on the other side, on the support bearing 5, which rests on the pipe body 11.

In the slotted pipe 13, which is located inside the telescopic joint pipes 8, 11, the wheel turning mechanism 15, which guides the outer section, is fixed in the 17, and the slotted shaft 16 is freely placed. The splined shaft 16 together with the splined pipe 13 acts as a shaft.

When the tractor is used for work between the rows, the pipe 11 is pushed to the outside of the hollow pipe 8 (Fig. 1, a) and the plug is fastened with bolts. When the pipe 11 is pushed against the hollow pipe 8, which is telescopically attached to it, together with it, the guide wheel is pushed to the tsap 4, which increases the agricultural clearance of the tractor, that is, the tractor has a high clearance. In this case, along with the pipe 11, the slotted pipe 13 is pushed along the slotted shaft 16 without breaking the connection between the turning lever 17 and the pin of the guide wheel 15. As a result, the tractor's agricultural clearance is maximum (h1), which ensures that the tractor can move between the rows without damaging the plants.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 9, Issue 10 , October 2022

When the tractor is used for transport work, the pipe 11 is pushed to the end of the hollow pipe 8 (Fig. 1, b) and the plug is fastened with bolts. In this case, along with the pipe 11, the slotted pipe 13 is pushed along the slotted shaft 16 without breaking the connection between the turning lever 17 and the pin of the guide wheel 15. In this case, the traction of the tractor is minimal, which increases the stability of the tractor in turns.

III.CONCLUSION

The use of a front bridge with a sliding elbow on universal cotton tractors allows to change the agrotechnical plowing as well as the road plowing. Therefore, it can be used both in transport work and in interrow processing of cotton crops without major structural changes.

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