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Analysis of Loosener Working Bodies

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Abstract:

This article presents an analysis of combined softeners of various structures and their technological work processes intended for basic and surface soil treatment. Combined softeners that are structurally similar to each other and close in terms of technological work processes have been selected, which ensure sufficient compaction of the surface layer of the field along with tillage without a tiller. Accordingly, the advantages and disadvantages of the use of selected combined softeners in soil conditioning of dryland fields are presented.

Keywords: *combined, softener, technological, process, soil, structure, field, slope, pan.*

Introduction. Currently, the yield of grain crops is 7-15 quintals per hectare. However, experiments have proven that 15-25 centners of grain can be obtained from each hectare of land if agrotechnical measures are applied correctly [1-2]. So, although there is a possibility of obtaining high yields from drylands, the productivity in production is very low. This is mainly due to the fact that during the spring planting of sloping lands, due to the fact that the surface of the land is not sufficiently covered with plants, the heavy raindrops break down the soil aggregates and turn them into mud, and the resulting mud clogs the small capillary tubes in the soil in its way, reducing the water permeability of the soil, resulting in strong water flows on the slope. appears. This causes water erosion, and as a result, it causes the erosion of the upper fertile layer of the soil [3-5]. It goes without saying that the productivity of crops is sharply reduced in eroded soils. This shows that in order to increase soil fertility in dry lands, the work to be done should be aimed at maintaining soil moisture, removing soil on the surface of the field, and preventing erosion.

Therefore, improvement of working bodies in the development of machines for anti-erosion treatment of sloping fields and grain sowing in one pass is an urgent problem.

Research method. As an object of research, combined softeners of various designs intended for deep and surface soil treatment and their technological work processes were taken. The study of the structure of combined softeners of various designs and their technological work processes was carried out according to the results of scientific literature and patent examination [6-9].

According to the results of analytical studies, combined softeners were selected that are structurally similar to each other and close in terms of technological work processes. Accordingly, the advantages and disadvantages of using selected combined softeners in soil conditioning of dryland fields were studied.

Research results and discussions. Scientists of the Volgograd State Agrarian University have developed a combined tool for soil cultivation and fertilization. A combined working body (Fig. 1) was used in the weapon for surface treatment of the soil and fertilizing. The combined working body is a handle fixed to the frame, a vertical disk-shaped knife installed in the middle of the two sides, a parabolic arrow-shaped softening claw installed at the bottom of the handle, a coulter and a plow attached to it, a fertilizer transfer, consisting of a fan and a toothed drum leveler. The combined softening working organ claw angle is $27\text{-}30^0$, sharpening angle is $12\text{-}15^0$. The toothed drum leveler is made in the form of a thin long cylinder, and the smoothing teeth are arranged in a checkerboard pattern along the surface of the drum [10-11].

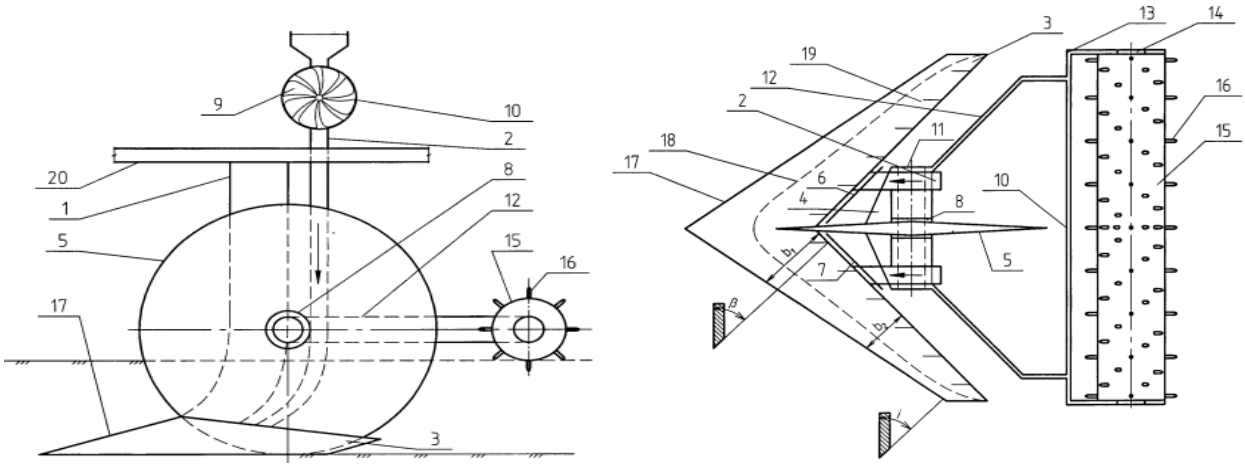


Figure 1. Combined working body for tillage and fertilization.

The task of the combined softener working body is to work on the surface of the soil, to apply fertilizer to the subsoil along the zone of the cultivated soil, and to soften and level the field surface according to the width of the softener blade coverage [12-15].

The combined softener working body is adapted to soften only the surface layer of the field. The gear drum aligner of the working body may not have a constant number of revolutions due to the fact that it operates under different operating conditions. This sometimes causes the drum to work in drag rather than rotation.

Russian scientists Abezin V.G. and others proposed a flat cutter-deep softener-fertilizer working body (Fig. 2). The working body of the horizontal softener-fertilizer is made up of a pin-shaped handle, a fertilizer conveyor placed in the rear part of the handle, a plow attached to the lower part of the handle with a hammer, and a softening drum mounted on the handle with a bracket. The blade of the working body is mounted on the handle at an angle to the direction of movement and the horizon. The working body of the softening drum is made in the form of a rectangular pyramid, and detachable teeth arranged in a checkerboard pattern are installed on the surface of the drum [16-18].

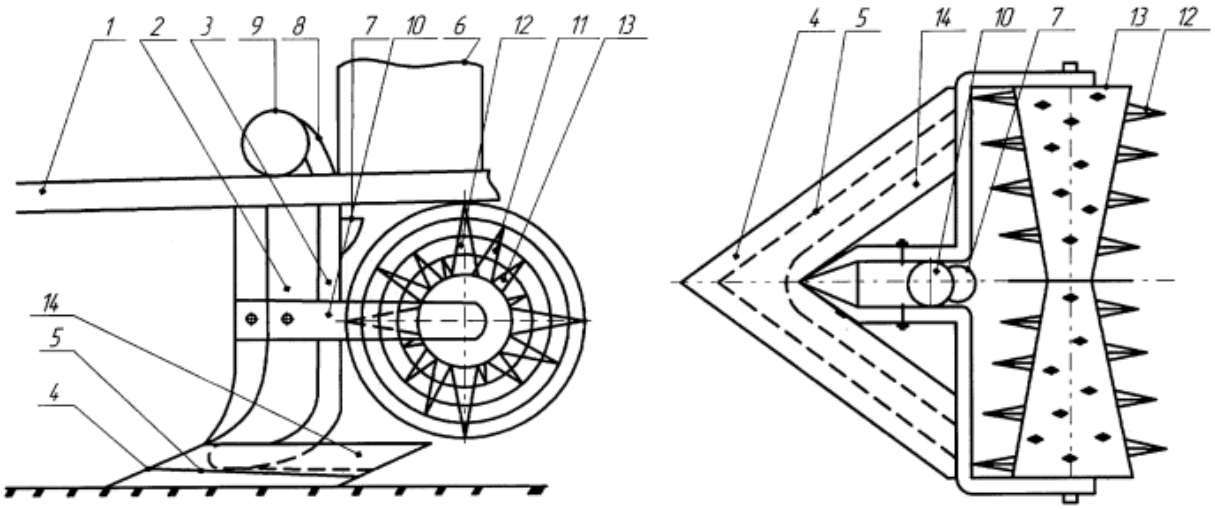


Figure 2. Tekiskeskich-deep softener-fertilizer working body.

The main task of the tekiskeskich-deep softener-fertilizer working body is to soften the surface layer of the field, to fertilize along the softened layer, and to soften and compact the soil zone where seeds are planted.

The working body of the tekiskeskich-deep softener-fertilizer is not intended for the main processing. One of the main disadvantages of the working body is that due to the close proximity of the working parts, the formation of blockages in the process of loosening the soil slab can cause the disruption of the technological process and increase the resistance to traction [19-21].

A softener-fertilizer working body (Fig. 3) was developed by Russian scientists. The working body consists of a pin-shaped handle, a fertilizer conveyor fixed to the back of the handle with a bracket, a coulter and ploughshare placed in the lower part of the handle, and a toothed softening drum installed in the front part of the handle. The softener drum is attached to a vertical bracket attached to the frame and to horizontal brackets attached to the middle of the softener handle. The softening drum is made in the form of a cylinder, and rectangular right pyramidal separable teeth are installed on it in a checkerboard pattern. The height of the removable teeth in the shape of a rectangular right pyramid is equal to the depth of the softening main processing [22].

As the toothed loosener drum moves along the surface of the field, the teeth penetrate the outer surface of the soil and break it up. In this case, favorable conditions are created for cutting the soil layer with plows in the horizontal plane, which ensures a significant reduction in the traction resistance of the softener-fertilizer during operation. The soil pulverized by a toothed drum is pressed along the ploughshare and falls from the top of the ploughshare in the form of small pieces. Fertilizer is applied from the bottom of the tiller when the soil plow is cut along the tiller, and the given fertilizer remains under the tiller [23].

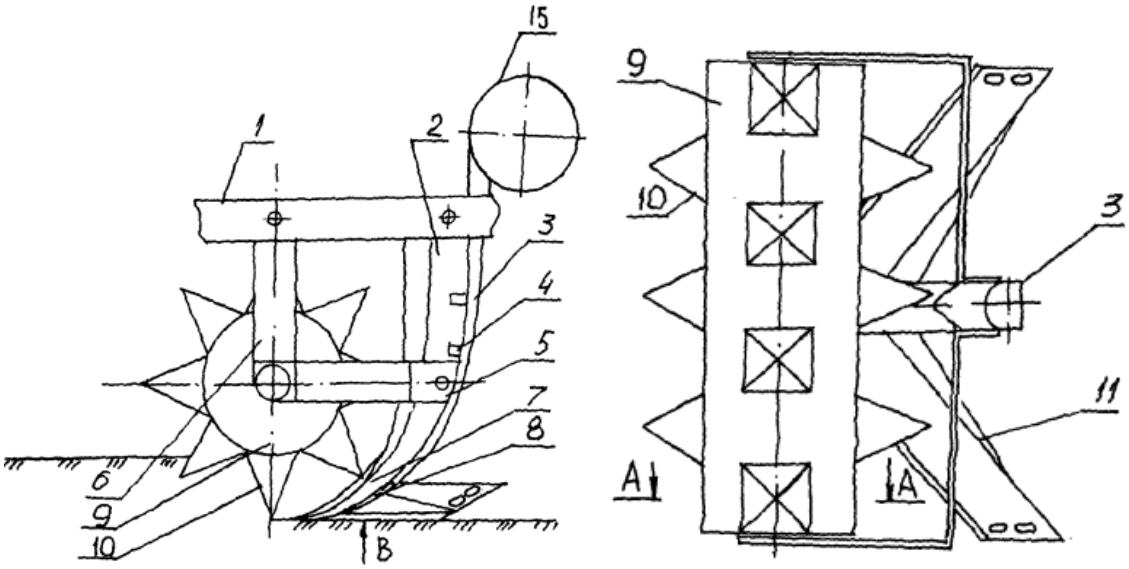
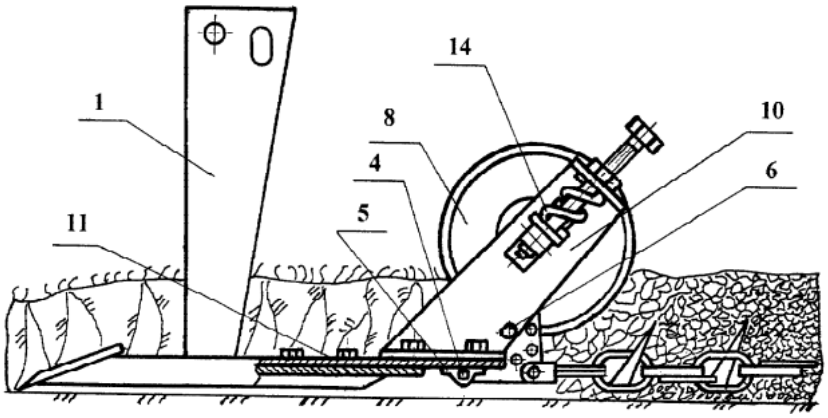


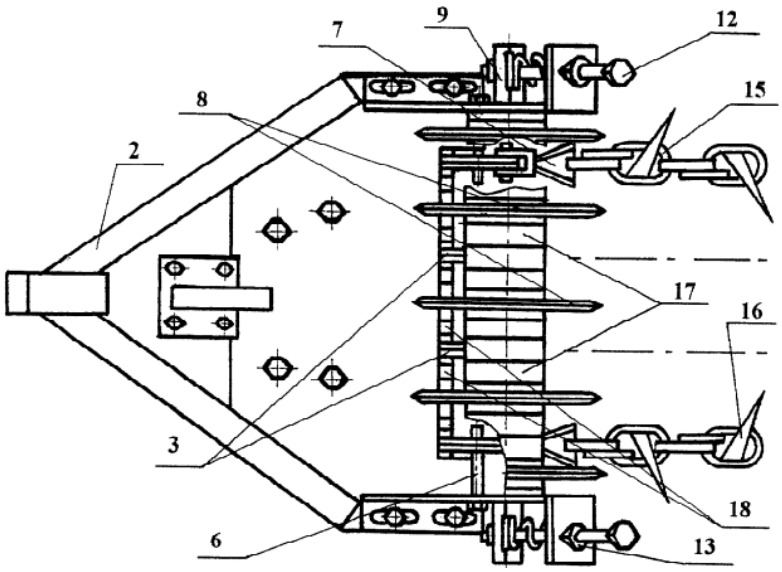
Figure 3. Softener-fertilizer.

The disadvantage of the softener-fertilizer is that the toothed softener drum is installed in front of the plows and at a close distance. In this case, the deformation that occurs when the ploughshares come into contact with the soil, that is, the lifting of the blade, causes it to get stuck in the toothed drum in front. This leads to an increase in the resistance to traction and to the breakdown of the process [24-25].

Scientists of the Belgorod State Agricultural Academy have developed a device for soil cultivation. The device is equipped with a combined softener (Fig. 4) as the main working body. The combined softener consists of a handle, a flat cutter with a ploughshare, an additional softener attached to the ploughshare from the back of the handle, a disk blade and a toothed chain. The additional softener consists of elements made in the form of a knife-shaped blade, between which disc-shaped blades are installed. The softener with disk-shaped blades is designed for processing the soil at a depth of 8-16 cm. Blade-shaped elements are fixed at an angle of 450 to the horizontal plane. The chain teeth are set at an angle to the vertical plane [26].

The device works as follows: a flat-cut claw blade cuts the soil and directs it to the plow blades, at the same time, the soil blade is compacted, and with the help of disk blades, a layer equal to 1/2-1/3 of the main processing depth is cut (top layer). The lower layer of the palaxa is crushed with the help of toothed chains.





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The combined softener is designed for surface treatment and does not have the same working conditions in soils with different physical and mechanical properties. In irrigated agriculture, the possibility of blockages between the blades in soils with high hardness can sharply increase its tensile strength and cause various deformations in the working parts [27].

Conclusion. OAccording to the results of scientific literature and patent examination, as well as the results of field experiments, it can be known that in the development of the combined deep softener-grinding working body, the mutual location of the working parts, the longitudinal and transverse distances between them, and at the same time the working parts deformations formed when the soil is affected with Taking into account the above, the scientists of the Karshi Institute of Engineering and Economics developed a combined deep softener-crusher working body that grinds the clods formed on the surface of the field along with deep tillage [28-29]. The working body of the developed combined furrow softener-shredder consists of a handle, a chisel, a softening claw for softening the surface layer of the field and cutting weeds, a seed conveyor, a grinder consisting of disk-shaped knives designed to grind the lumps on the field surface. In this case, the disk-shaped blades are arranged in a checkerboard pattern, and the softener is installed according to the width of the pawl coverage.

The combined soil softener-shredder softens the soil to a depth of 35-40 cm. The softening blade softens the cultivated zone of the field to the desired level and kills weeds. The seed is sown to the required depth with the help of a seed drill. A shredder consisting of disk blades compacts the soil along with grinding the clods on the field surface [30-31].

References

1. Mamatov F. et al. Machine for cultivation and sowing of cereal seeds on sloping fields //AIP Conference Proceedings. – AIP Publishing, 2023. – Т. 2612. – №. 1.
2. Mahamov K. T., Tovashov R. K., Ochilov S. U. Part of the soil surface with minimal tillage analysis of lateral suction techniques and technologies //Academicia: An International Multidisciplinary Research Journal-Kurukshetra. – 2020. – №. 10 (4). – С. 706.
3. Товашов Р. Х. и др. НИШАБЛИКЛАРГА ИШЛОВ БЕРИШ ВА ЭКИШ СЕЯЛКАСИ АРИҚ ОЧГИЧНИНГ ТАЖРИБАВИЙ ТАДҚИҚОТЛАРИ НАТИЖАЛАРИ //Инновацион технологиялар. – 2021. – №. Спецвыпуск 1. – С. 105-108.

4. Kh T. R. Theoretical basis of the crushing angle of the loosening working body blades of the combined machine //Инновационная наука. – 2020. – №. 10. – С. 23-25.
5. Tovashov R. K. Theoretical basis of the installation corner in relation to the direction of movement of the furrow opener working body of the combined machine //РАЗВИТИЕ НАУКИ И ТЕХНИКИ: МЕХАНИЗМ ВЫБОРА И РЕАЛИЗАЦИИ ПРИОРИТЕТОВ. – 2020. – С. 26.
6. Mamatov F. et al. Working body of the machine for sowing cereals on slopes //AIP Conference Proceedings. – AIP Publishing, 2023. – Т. 2612. – №. 1.
7. Mamatov F. et al. Ridge forming machine for sowing cereals on sloping fields //E3S Web of Conferences. – EDP Sciences, 2023. – Т. 401. – С. 04051.
8. Маматов Ф. М., Махамов Х. Т., Товашов Р. Х. Нишаб ерларга ишлов берадиган машина юмшаткичининг тажрибавий тадқиқотлари натижалари //Инновацион технологиялар. – 2021. – №. 1 (41). – С. 27-30.
9. Maxamov XT T. R. X. Tavashov Sh. X., Safarov FS Theoretical basis of the parameters of the base of antique chairs //International Journal of Trend in Scientific Research and Development (IJTSRD), India. – 2022. – Т. 6. – №. 2. – С. 1213-1217.
10. Патент RU 2766201 C1 Комбинированное мелиоративное орудие для внутрипочвенного внесения удобрений при обработке почвы // Семененко С.Я., Овчинников А.С., Дубенок Н.Н., Бородычев В.В., Марченко С.С., Чушкина Е.И., Кулагина О.А., Агеенко О.М. // Бюл.-2022. - №4
11. Tovashov R. Нишаб ерларга ишлов берадиган машина корпусининг тажрибавий тадқиқотлари натижалари //Science and innovation. – 2022. – Т. 1. – №. A6. – С. 411-415.
12. Товашов Р. Х., Товашов Б. Р. Результаты экспериментальных исследований рыхлителя сеялки //ИНТЕЛЛЕКТУАЛЬНЫЙ ПОТЕНЦИАЛ ОБЩЕСТВА КАК ДРАЙВЕР ИННОВАЦИОННОГО РАЗВИТИЯ НАУКИ. – 2021. – С. 27-31.
13. Tovashov R. X., Safarov F. S., Maxamov A. U. Theoretical justification of parameters of backrest of antique chair. – 2022.
14. Mirzaev B. et al. Combined machine for preparing soil for cropping of melons and gourds IOP Conference Series: Earth and Environmental Science, 403 DOI: 10.1088. – 1755-1315/403/1, 2019. – Т. 12158.
15. Алдошин Н.В., Маматов Ф.М., Исмаилов И.И., Тавашов Р.., Васильев А.С. Обработка почвы и посев зерновых культур на склоновых полях. *Агроинженерия*. 2023;25(3):30-34. https://doi.org/10.26897/2687-1149-2023-3-30-34
16. Патент RU 2599164 C1 Рабочийорганплоскореза-глубокорыхлителя-удобрителя-выравнивателя//Абезин В.Г., Моторин В.А., Скрипкин Д.В., Цепляев А.Н.//Бюл.-2016.-№28
17. Xo‘jaxmat o‘g‘li, T. R. . (2023). Nishabli Dalalarga Ishlov Beradigan Va Don Ekadigan Mashinaning O‘Rkach Hosil Qilgichining Harakat Yo‘Nalishiga Nisbatan O‘Rnatilish Burchagini Asoslash. *Journal of Innovation, Creativity and Art*, *2*(2), 27–31.
18. Rustam Xo‘jaxmat o‘g T. et al. KOMBINATSIYALASHGAN MASHINANING ARIQOCHKICH ISHCHI ORGANINING HARAKAT YO ‘NALISHIGA NISBATAN O ‘RNATILISH BURCHAGINI NAZARIY ASOSLASH //JOURNAL OF INNOVATIONS IN SCIENTIFIC AND EDUCATIONAL RESEARCH. – 2023. – Т. 6. – №. 1. – С. 147-151.

19. Rustam Xo‘jaxmat o‘g T. et al. THEORETICAL JUSTIFICATION OF BELT TRANSMISSION PARAMETERS //American Journal of Science on Integration and Human Development (2993-2750). – 2023. – Т. 1. – №. 9. – С. 208-212.
20. Rustam Xo‘jaxmat o‘g T. et al. Calculation Of The Strength Of Welded Joints //American Journal of Engineering, Mechanics and Architecture (2993-2637). – 2023. – Т. 1. – №. 9. – С. 10-13.
21. Tovashov R. et al. Combination machine for soil cultivation and sowing grain //E3S Web of conferences. – EDP Sciences, 2021. – Т. 264. – С. 04049.
22. Патент RU 2514403 C1 Рыхлитель-удобритель // Абезин В.Г., Цепляев А.Н., Богданов С.И., Цепляев В.А. // Бюл.-2014. - №12
23. Irgashev D. B., AR R. X. T., Sadikov O. T. Mamadiyorov. Technical Analysis of Plug Software When Working Between Gardens //International Journal of Advanced Research in Science, Engineering and Technology. – 2022. – Т. 9. – №. 5.
24. Mirzaev B. et al. Combined machine for preparing soil for cropping of melons and gourds //IOP Conference Series: Earth and Environmental Science. – IOP Publishing, 2019. – Т. 403. – №. 1. – С. 012158.
25. Fayzullayev K. et al. The quality of loosening the soil with subsoilers of the combined machine //IOP Conference Series: Materials Science and Engineering. – IOP Publishing, 2021. – Т. 1030. – №. 1. – С. 012171.
26. Патент RU 2239297 C1 Способ обработки почвы и устройство для его осуществления // Скурятин Н.Ф., Швец А.В., Мартынов Д.А. // Бюл.-2004. - №6
27. Kh T. R. Makhamov Kh. T. Analysis of combined machines for minimal tillage of soil //International Journal of Advanced Research in Engineering and Technology. – 2020. – Т. 11. – №. 8. – С. 609-616.
28. Kh T. R. Makhamov Kh. T., Tovashov BR Justification of Parameters of the Loosening Working Body //International Journal of Advanced Research in Science, Engineering and Technology. – 2020. – Т. 7. – №. 7. – С. 14336-14339.
29. Kh M. et al. IOP Conf. Series //Materials Science and Engineering. – 2020. – Т. 883. – С. 012179.
30. Товашов Р. Х., Ашуров Б. Analysis of the working bodies of the ridger //Просвещение и познание. – 2022. – №. 5 (12). – С. 9-15.
31. Товашов Р. Х., Ашуров Б. Analysis of bodies for plowing soil crest //Просвещение и познание. – 2022. – №. 5 (12). – С. 3-8.