

MANURE SPREADING MACHINE OF 5 TONS CAPACITY, MG-5

MASINA PENTRU ADMINISTRAT INGRASAMINTE ORGANICE SOLIDE, CU MASA UTILA DE 5 TONE, MG-5

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Abstract: In this paper is presented the new manure spreader machine, which has been designed in Romania, at INMA Bucharest and aims at performing the natural fertilizing by manure spreading. It has been achieved with help of a consortium, comprising 5 partners: INMA Bucharest, INOE 200 - IHP, INCDMF Bucharest, University Transylvania Brasov, Polytechnic University, Bucharest

Rezumat: In aceasta lucrare este prezentata noua masina destinata fertilizarii organice, proiectata in Romania, la INMA Bucuresti. La realizarea ei a participat un consorțiu format din 5 parteneri: INMA Bucuresti, INOE 2000-IHP, INCDMF Bucuresti, Universitatea TRANSILVANIA din Brasov, Universitatea POLITEHNICA Bucuresti.

Key words: manure spreading machine

Cuvinte cheie: mașina pentru administrat îngrășăminte

PREMISES OF ACHIEVEMENT OF MACHINE MG-5

The sustainable development of agriculture became almost compulsory in terms of food safety as a result of endorsement of Lisbon strategy by member states of European Union and those in course of accession to EU in 2000, when Romania assumed its objectives and structural reforms. The whole evolution will be based on natural factors (water, soil, biodiversity, air), vegetal and animal genetic resources and will contribute to preserve the landscape and environment.

The main objective of Community policy regarding the rural development consists in promoting and enhancing an environmental friendly agriculture, an ecological agriculture able to satisfy the exigent consumers' demand both qualitatively and quantitatively.

Within this content, there have been taken concrete measures of developing the manure fertilizing technologies by creating an experimental model of a competitive machine (both in country and abroad) and whose technical characteristics will be further presented.

UTILIZATION DOMAIN, PRODUCT'S DESTINATION

MG-5 machine is designed to transporting and spreading the manure on slope fields up to 6° declivity, for cereal crops, technical plants vegetables etc. It can perform the transport of maximum 5 tones of manure. This machine works in aggregate with tractors of over 65 HP.

GENERAL DESCRIPTION

The manure spreading machine MG-5 frames in terms of destination within "special trailers" category and, as for its construction is a "rigid hitch trailer"(according to RNTR-2- "Regulations and technical norms which road vehicles have to fulfil in view of their accessing to Romania's public roads").

The machine comprises the following main subassemblies:

- chassis 1 pc;
- dipper 1 pc;



Fig.1 Manure spreading machine MG-5
(Side and perspective view)

- running gear	1 pc;
- conveyor	1 pc;
- transmission	1 pc;
- conveyer acting	1 pc;
- service break	1 pc;
- parking break	1 pc;
- spreader device	1 pc;
- additional front shutter	1 pc;
- signalling installation	1 pc;
- supporting base	1 pc;
- acting pump	1 pc;
- wheel base	2 pc.

The chassis is a welded metallic construction comprising longerons and crossbars, manufactured of special standardized sections. This chassis is made of the principal welded parts – the frame and the hitch which is endowed at its front side with a towing eye with $\Phi 50$ internal diameter and $\Phi 30$ ring surface- dimensions allowing the chassis to be coupled to hitch type yoke (entering the tractor's endowment). The regulations in force (Directive 89/171/CEE-Annex IV “Mechanical Coupling between Tractors and Towed Vehicles ”) are respected therefore permitting the machine to be coupled to different tractors manufactured in country or abroad, belonging to appropriate power class. At its upper part the frame is endowed with 3 crossbars, especially manufactured, on which the dipper is supported.

At hitch upper part there is a supporting base self- hydraulically driven. It is driven from a pump which takes over the oil out of an own tank.

The dipper is a body shell construction flaring to its rear part in order to allow the material to move towards the spreader, without any blocking.

The dipper's bottom is made of sheet welded on crossbars. The dipper walls are welded and supported by “U” section welded on principal longerons of dipper. The dipper has 4.5 m³ volumes allowing loading at maximum 5 tones, while the volume mass of manure varies between 700 and 1000 kg/ m³.



Figure 2. Dipper of machine MG-5

The rolling system is one –axis type and comprises an axle with brake supporting a maximum load of 6000 kg. The wheels tyres are 385/65-R 225, of 1092 diameter, 408 width and section 2 with a carrying load of tyre of 4800 kg, the arranging diameter of 8 studs being of 275 mm. The axle is made of a bar with square section whose side measures 70 mm, manufactured from OLC 35 improved material. On the axle are welded the disk, the plate, the axle box and the bolt which ensure the coupling to wheel braking parts and also the supporting plates for braking cylinders and plates on which is to be set the proper chassis.

The conveyor is of type with scrapers welded on chain. The 20 scrapers are driven by certain special wheels of division diameter of ϕ 120 mm.

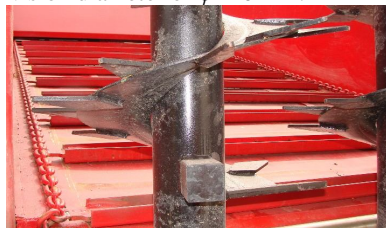


Figure 3 Machine's conveyor MG-5

The spreading device is endowed with vertical drums in shape of windings on which are mounted chopping knives. At the rear part there are centrifugal disks permitting the material falling on drum's rear part to be spread on drum's winding's. The spreading device drums are arranged at 15° angle in comparison with vertical, in order to allow the material to be easily carried away out of the bucket according to its natural slope angle.



Figure 4. The spreading device

The conveyor's driving system comprises the installation's IH elements that the tractor U-650M is endowed (T-tank-oil bath of transmission system, P_v-volume pump with gear wheels, externally acted, S_s-safety valve, S_i-direction type valve, normally close, R_h-choke hydraulic resistance, F_r-return filter, DH-battery distributor D3-40/75), RD-flow regulator with three running entries HK V6 2150323 (HANSA FLEX Company) settled on a base plate, connecting elements (rapid couples, hoses, high pressure pipe-externally calibrated, straight joints, and T-shaped joints). The conveying belt's shaft with scrapers is driven by means of a gear motor comprising the orbital hydraulic engine OMP 160 (SAUER DAMFOSS Co).

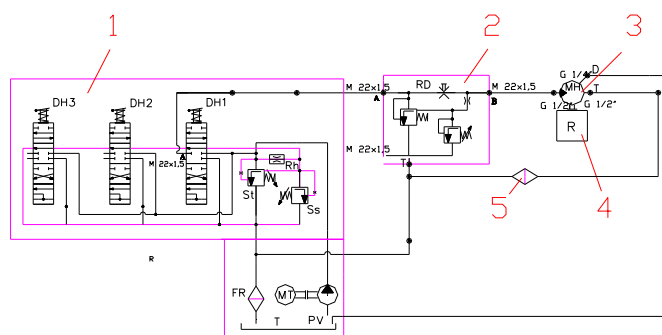


Figure 5. Diagram of hydraulic installation of machine MG-5

1. battery distributor D3-40/75 (entering the hydraulic installation /H-/ existing on tractor);
2. three entries flow regulator; 3. orbital hydraulic engine OMP 160;
4. planetary reducer RA 510 FS; 5. return filter Pi 2205.

The service brake is pneumatic type being endowed with a pipe and comprising two braking cylinders of Φ 125 mm diameter, a tank of compressed air, a mobile semi couple, additional self-distributing valve, fitting nipples, hoses, etc).



Figure 6. Parking braking, wheel chock, intermediary transmission

The parking brake is a mechanical brake comprising the acting device, pulleys, cables etc.

Wheel chock (MG 5, item 14) with 2 anchor pins is supplied by SC RIMAGRA SA Piatra Neamt that manufactures these pins.

Intermediary transmission is the transmission ensuring the connection between

tractor PTO's shaft and spreading device's principal reducer determining its proper operation. The transmission report to spreading drums is 1:1.



Figure 7. Intermediary transmission (rear view)

Additional front shutter is a shutter made of a frame on which is welded a wire net. It is mounted at front part of the machine and it impedes the material to discharge over the frontal universal joint and machine's hitch.

Inspection door is performed in order to permit to control the conveyor in steady state and interfere to visiting the conveying belt. It is driven by means of a pneumatic cylinder, central-mounted.

Supporting base is hydraulically driven and it is used when the machine is uncoupled from tractor, in stationary state.

Acting pump enables the supporting base driving.



Figure 8. Manure spreading machine MG 5- Perspective view

CONCLUSIONS

The manure spreading machine, MG 5, comprises the newest constructive solutions in accordance with these on external market, enabling this way the import reduction.

By its utilization within manure spreading technologies there can be obtained results comparable to these of machines manufactured abroad, but at a lower cost.

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