RR420 ROTARY RAKE

OPERATORS MANUAL

Issue 8c - 5/2020

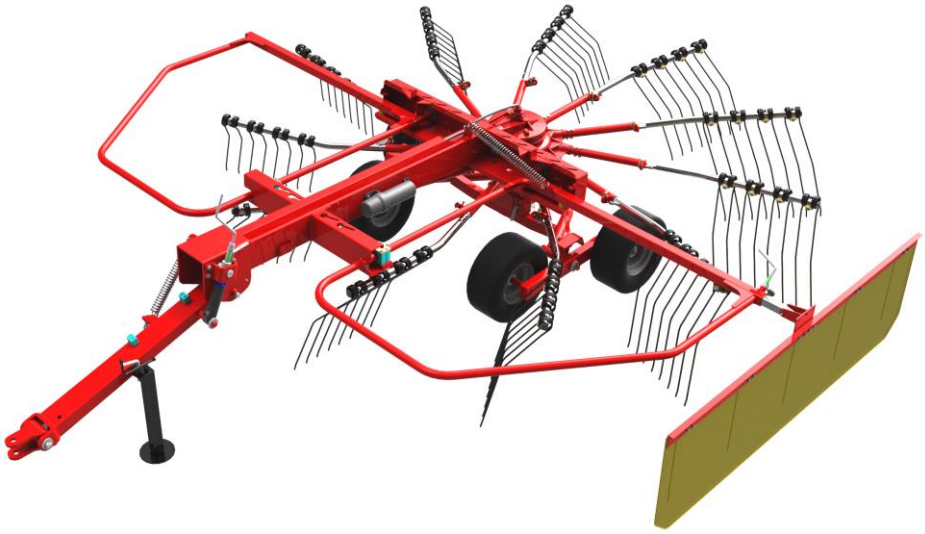

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TABLE OF CONTENTS

A. INTRODUCTION

A.1 About the manual

The H&S firm ("Manufacturer") designed and created the device in accordance with the associated safety standards to ensure the safety of personnel and the entire operating system.

Each rake is supplied with a copy of this manual which the operator must read in full before using the equipment. The manual contains all information relating to transportation, use and maintenance of the equipment, as well as safety instructions.

Poor knowledge of the operating system can lead to accidents and therefore damage to the equipment. Although the Manufacturer provides the Customer with all information relating to the rake operation, use and maintenance, the Customer is still expected to read this manual and take note of all the instructions herein.

The manual provides all the necessary instructions on how to ensure optimal working order and safety.

The manual was drawn up according to the current technical and structural characteristics of three models of rake and does not cover previous similar models. The Manufacturer therefore reserves the right to modify models in production in the interest of improvement or due to any new legislation (Machinery Directive), without being obliged to modify previous models.

This manual is integral to the rake and must therefore be kept intact, clean and in good condition. It should also be in a container, either on the frame of the rake or in the tractor cabin, where it can be easily accessed for consultation.

The manual must be kept in its container if the rake is taken out of service. Ask the Manufacturer for a duplicate copy if the original manual is lost.

Please contact the H&S Dealer for any clarifications relating to the instructions in this manual.

Symbols used in this manual:

HAZARD

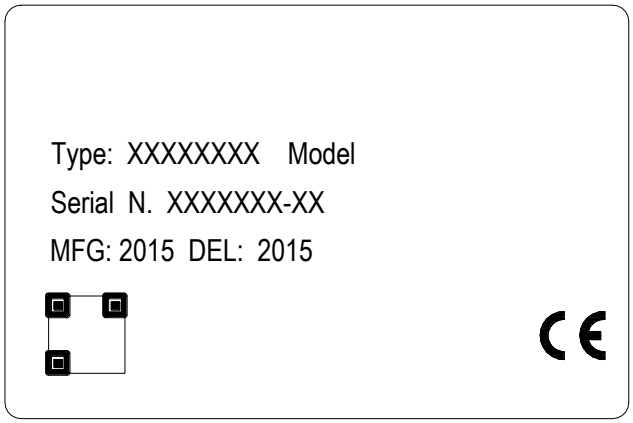
Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. It is also used to alert against unsafe practices.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It is also used as a reminder of good safety practices.



IMPORTANT

The operator must take the respective information into account.

Note indicates that the information referred to can facilitate the operator work.

A.2 Identification

An identification plate is applied to each machine:

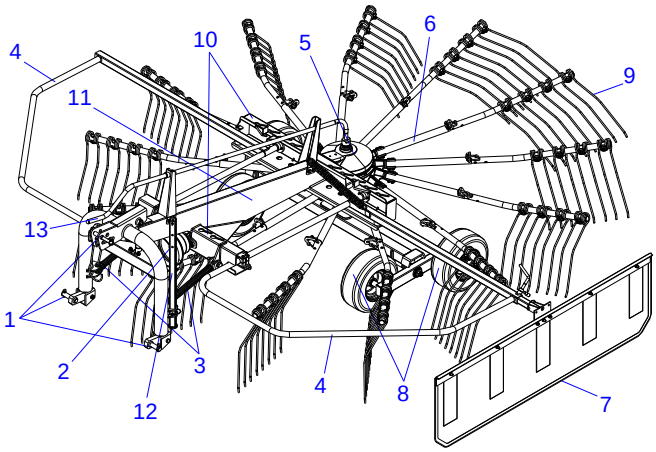
You must have this information at hand when requesting assistance and spare parts.

IMPORTANT

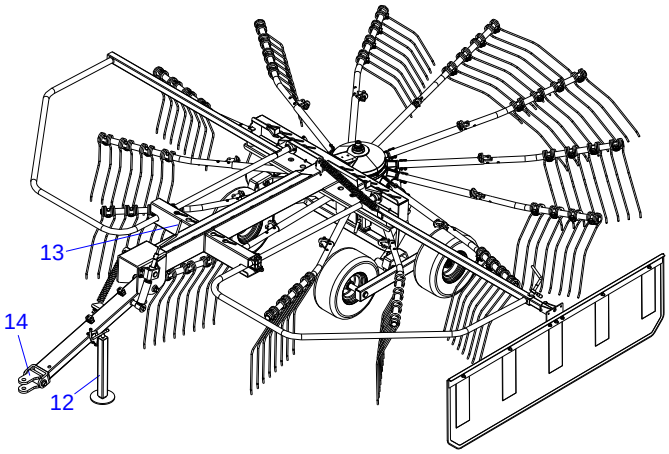
It is strictly forbidden to alter and/or eliminate the data on the serial plate. The operator must check the legibility of the data on a regular basis and inform the Manufacturer if it becomes in any way illegible. The Manufacturer will then replace the old plate with a new one bearing the same data.

A.3 Main components and technical data

1. Three-point hitch
2. Cardan shaft attachment
3. Steering damper spring
4. Lateral protection screens
5. Working rotate unit
6. Tine-holder arm
7. Lateral deflector
8. Wheels
9. Windrowing tines
10. Arm-holder supports
11. Frame
12. Bearing foot
13. Adjusting lever of tine height
14. Tow hitch



MOUNTED TYPE



PULL-TYPE

TECHNICAL FEATURES		**RR 420 EVO** MOUNTED	**RR 420 EVO** PULL-TYPE	
Transport width	cm.	170	170	
Working width with windrow	cm.	400	400	
Windrow width	cm.	80	80	
Tine-holder arms	nr.	11	11	
Double tines	nr.	4 / 44	4 / 44	
PTO	rpm	540	540	
Trator power	Hp	30	30	
Tractor speed in working phase	km/h	15	15	
Cardan shaft + torque limiter	Nm	600	600	
Tires - Ballon 18”- 8.50”x8”	nr.	4	4	
Weight	kg	625	600	

A4 Warranty

H&S (called Manufacturer) guarantees every component of the windrow rotary rake is without defects, as they are tested before delivering the machine to the Customer. **The warranty has a 1 year validity starting from the date indicated on the tax delivery document, except different agreements underwritten with the Customer.**

However, upon receipt of the windrow rotary rake, they must verify that it is intact and complete in its every part. Any claims must reach the Manufacturer in writing within 8 days from receipt of the equipment.

H&S commits to replace the components that, for manufacturing or material defects, cause a fault in the operation at its establishment, within the warranty period and free of charge. Should it not be possible such replacement at its own premises, the Manufacturer commits to sending the faulty pieces at the Customer's premises.

With regard to these replacements, H&S does not waiver the warranty period during the time which the windrow rotary rake remains still, or recognises any damage or indemnity to the Customer, for direct and indirect expenses or damages. Should the intervention of our technician be required, the relative labour, travel and overnight expenses will be fully charged to the Customer. Only the Manufacturer or its technicians can ascertain the fault.

However, it must be taken into consideration that:

- the faulty pieces remain the property of the Manufacturer;
- should replacement be carried out at the Customer's establishment, the faulty pieces must be returned and, therefore, sent to the Manufacturer, for subjecting to technical review, integrates without tampering, without tampering and **carriage paid;**

- in case faulty pieces cannot be returned to the Manufacturer within 30 days, from date of receiving the new ones and with the methods described in the previous point, the Manufacturer reserves the right to sending an invoice for the new delivered pieces.

The warranty is not recognised:

- during transport as the windrow rotary rake travels under Customer responsibility;
- when faults derive from improper or incorrect use of the windrow rotary rake or operator negligence;
- when faults are caused by normal wear, even with the windrow rotary rake not working;
- in case of late signalling of the manufacturing defects;
- in case of accidents or fortuitous cases of force majeure.

The warranty becomes void in case:

- the windrow rotary rake is used by non-appropriately trained personnel;
- the indications and/or regulations in these instructions have not been followed or complied with;
- the envisioned maintenance interventions have not been carried out;
- the Customer makes modifications to the windrow rotary rake without the written authorisation of the Manufacturer or tampers with the components;
- non-original spare parts are used or non-conform to those recommended by the Manufacturer.

However, the warranty period recognised for the windrow rotary rake is not valid for all components that are not produced by the Manufacturer and for which that reported in the relative purchase notes remains valid.

IMPORTANT

The Manufacturer does not guarantee conformity of the windrow rotary rake with the legal dispositions in force and, in particular, with those relating to accident-prevention and pollution in the non-E.U. Countries. The adaptation of the windrow rotary rake to the respective regulations will be the full responsibility and at the expense of the Customer. The Manufacturer is relieved from every responsibility, if the inobservance of these regulations raises controversies or causes any damage.

B. SAFETY

B.1 General rules

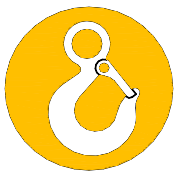
This manual describes the safety regulations to be followed when using the rake. As most work-related accidents occur due to non-compliance with the most basic of safety regulations, **it is mandatory** to read this manual before using the rake and to follow all the instructions.

In its use the equipment must be used by qualified adult personnel trained. **The Manufacturer cannot be held liable for accidents due to the operator's negligence and/or non-compliance with the safety instructions. In this case the Manufacturer assumes no responsibility and the warranty is forfeited.**

B.2 Transportation, Installation and Movement

Transport (delivery)**:** This operation is carried out by a vehicle with dimensions and weight suitable to the equipment. Load and unload operations from the vehicle can be done either by using a lifting device or by using appropriate ramps hooked to the vehicle:

- In the first case, the vehicle must have suitable features and slings to support the windrow rotary rake. Trained personnel will carry out the operation by holding the equipment in the indicated sections on the frame, set for this purpose. - **Note:** *to protect the integrity of the frame, it is recommended to not handle the windrow rotary rake with metal chains, but to use approved belts. However, an adhesive label has been applied to the points where it should be fixed or sling should pass through, containing a hook (as in figure), to highlight its use.*



- In the second case instead, by using a forklift truck or a tractor, the equipment is pushed in reverse to the vehicle loading surface.

In both cases, the equipment must be in compliance with the transport configuration (forward described) and, once placed on the vehicle, it must be fastened to its structure and provided with all the safety devices required for transportation.

HAZARD

Load and unload operations always entail dangerous situations, thus requiring the operators in charge to be very careful.

However, it is recommended to always observe the following **precautions:**

- operations must always be carried out on an even surface and by respecting a safe distance from escarpment or ditch borders;
- ensure ramps are robust enough to support the windrow rotary rake, that are firmly fastened to the vehicle structure, parallel between them and perpendicular to the vehicle side;
- ensure ramps are clean, without any trace of oil, grease or ice;
- do not change direction during ascent/descent operations of the windrow rotary rake on ramps. Should the path must be changed, take back the equipment and proceed with its correction.

For long distances, the equipment is transported dismounted inside a wooden box. Once the components are delivered, detailed instructions allow the Customer to easily and rapidly assemble the windrow rotary rake. So in the event the equipment is sold or transferred to another user, follow the instructions in the reverse order to dismount it.

Installation: the **pull-type** model windrow rotary rake can be installed on any agricultural tractor, provided with a tow hitch and rear auxiliary hydraulic couplings; whereas the **mounted** one can be installed on any tractor provided with rear universal 3-point hitch and of coupling and hydraulic lift.

IMPORTANT

The tractor must also, by law, be fitted with a protective Roll-bar or ROPS or FOPS cabin. **It is strictly forbidden to install the equipment on a tractor without the required protection equipment.**

However, before installing, the Customer must consult the relative use and maintenance manual to ensure the tractor has the necessary requisites for the windrow rotary rake use and function and/or is equipped with ballasts to eliminate any unbalances that might cause its overturn.

For instructions relating to the installation of the windrow rotary rake and any hydraulic connections, consult the relative paragraphs. For information relating to the cardan shaft, follow those attached to the accessory.

Moving on road: pull-type windrow rotary rake can be moved on road only if it is connected to the towing hook; whereas the **mounted** one must be lifted by using the hydraulic lift, until the lowest section results at 40/50 cm from the ground. In both cases, the following obligations must be complied with:

- **rear overall dimensions:** the operator must apply special panels to the windrow rotary rake (**either if it is mounted or pull-type**), to highlight the tractor rear dimensions. They must be applied on the three visible sides and be retro-reflecting and fluorescent with yellow and red stripes, and be approved. Moreover, transversal dimensions of the equipment must never be higher than the tractor's shape and therefore, it must always assume the set **transport configuration** (with side protection screens closed and teeth-holder bar removed) as indicated in the **fig.4**.

- **signaling devices:** the tractor must be mandatory provided with the light flashing device (yellow or orange) always operating. Moreover, visual signal and lighting devices of tractor must be repeated or moved if dimensions of the windrow rotary rake do not allow visibility. In this case it will be necessary to install on the equipment rear part a special light bar;

- **weight:** the total mass of the machinery (tractor with windrow rotary rake) must not exceed 30% above the normal mass of the tractor, indicated on its vehicle registration. The tractor must always move at moderate speed, especially on slopes, because the rear weight may cause loss of control;

- **laws:** however, it is recommended to know and comply with laws on road circulation in your Country.

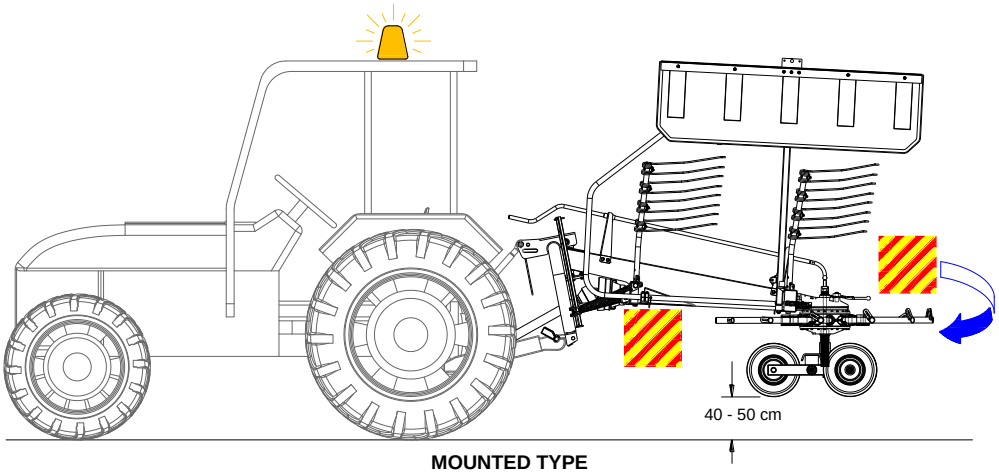
During the machinery on-road moving (tractor with windrow rotary rake), the operator in the cabin must observe the following precautions:

- must not take passengers on the tractor;

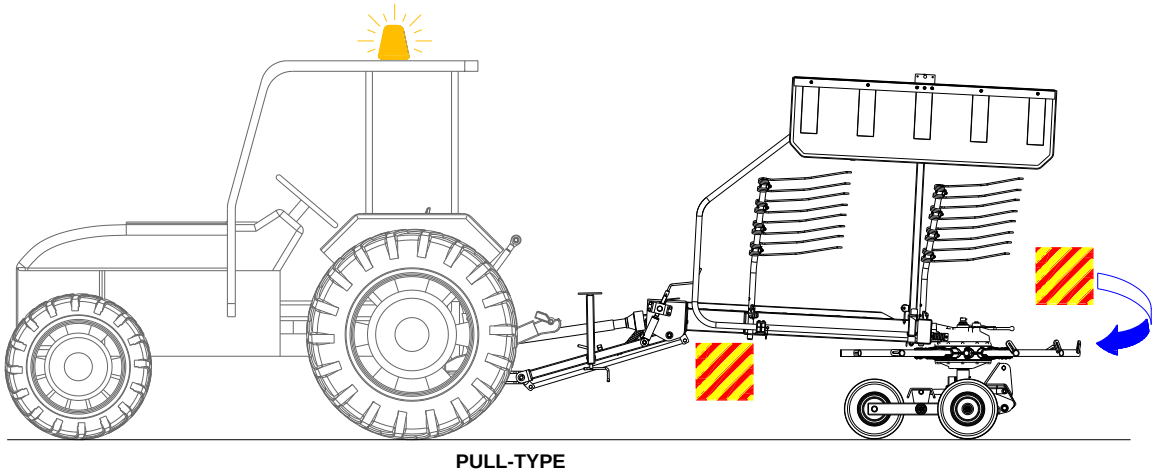
- must not transport persons or animals on the equipment;

- PTO must always be disengaged.

Fig.4

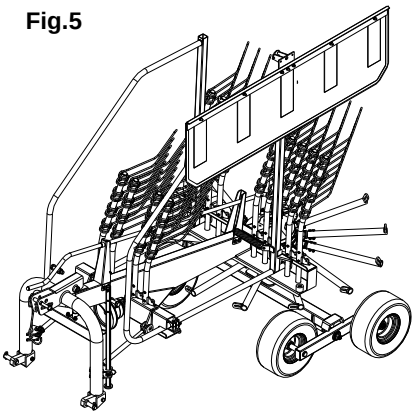


MOUNTED TYPE

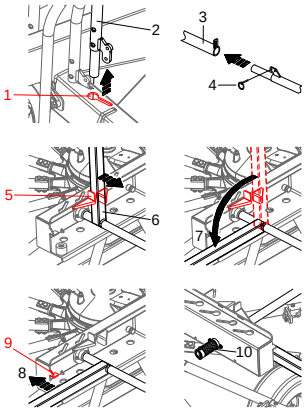


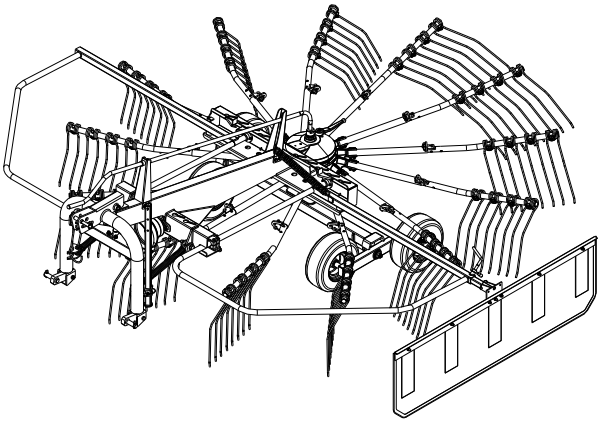
PULL-TYPE

Fig.5



TRANSPORT CONFIGURATION





WORKING CONFIGURATION

Moving on fields: inside them the machinery must not activate any luminous signal or buzzer or display any type of panel. The windrow rotary rake must assume the **working configuration** only before operating.

Working configuration (both mounted and pull-type - **fig.5**):

- one at a time, remove tine-holder arms (**2**) from respective supports on frame (**1**) and place them in each housings on work rotating unit (**3**) to then block them by using safety pin (**4**);

- first from a side and then from the other: pull forward, towards tractor connection, the side protection screen (**6**), so to unhook it from the mechanical block (**5**) by using for transportation;

- keeping it still pulled, rotate it downwards, as indicated in figure (**7**), and release it only when it is placed on the frame so to be blocked by its relative work mechanical block (**9**). When the screen (**8**) is released, an appropriate spring (**10**) will takes it back to the initial position. **Note:** *on the left side of the windrow rotary rake, the mechanical block is not set. During the process, the side deflector weight keeps the side screen in position;*

- for the use and the relative operating adjustments, to consult the following paragraph.

B.3 Intended use and warning of employ

The windrow rotary rake is an agricultural equipment used to harvest any other type of previously cut forage, with formation of windrows.

The rake can be either mounted or pull-type. The **mounted** type can work only if installed on any agricultural tractor equipped with 3-point universal hitch and hydraulic lift. Whereas, the **pull-type** must be connected to the towing hook installed behind each tractor. The operation is common for both types and it is obtained both by effect of the tractor towing and by effect of the rotation of them working units. This rotation is provided by a cardan shaft coupled to the tractor PTO. The arm rotating motion and the action of tines allow to realise even and well ventilated windrows.

On the **pull-type** rake there are two hydraulic cylinders, which operation allows to adjust the tine adaptation to the ground and to lift them for the tractor change of direction at the end of the field or in reverse. These cylinders are powered by the tractor auxiliary hydraulic circuit, through hoses equipped with quick couplings and controlled by a special lever placed inside the cabin.

The windrow rotary rake must be used only by adult, qualified and trained personnel and aware of the instructions contained in this manual. Safety is of prime importance for the personnel who use the equipment or who perform repairs or maintenance. Given that the provided instructions cannot cover all possible working situations and related danger, personnel should always use caution and common sense.

Before starting the tractor and begin working, it is important:

- verify that the equipment has been correctly installed on the tractor;

- verify that all locking and safety devices are present and undamaged;

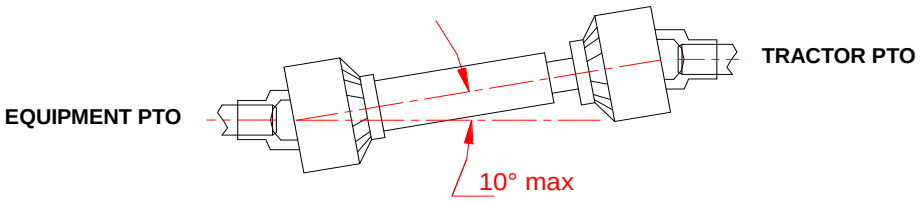


Fig.6

- on the tractor PTO, verify that the rpm is of **540** and that it rotates clockwise. Moreover, ensure it is disengaged.

IMPORTANT

PTO must never be engaged with the engine off and with an inclination higher than 10° between joints of the two connections (tractor/windrow rotary rake - fig.6);

- verify that the cardan shaft is correctly installed and all blocking and safety devices are present and undamaged. **Should one of these be not installed or non-approved devices be mounted, the Manufacturer warns the Customer to not use such shaft because it is forbidden;**

- do not use the equipment if failures or damages are present especially on the protective devices;

- **only for the mounted type** - lower slightly the equipment to the ground by using the tractor hydraulic lift. Avoid violent impacts, which may provoke damages to the structure or components;

- perform the daily maintenance tasks (described in the relative paragraph). For such purpose, remind that any kind of intervention (check, adjustment, maintenance, etc.) **must be performed with the tractor stopped, with PTO disengaged, with its engine off;**

- verify that the position of the side deflector and of the tines in relation to the ground. Should their adjustment be required, consult the respective paragraph;

- verify that no people or animals go in the **dangerous zones** of the equipment (shown in **fig.7**), because they are not conscious of possible dangers;

- the operation of the equipment is allowed in **good lighting** and **visibility conditions**. Should these conditions lack, even partially, it is recommended to interrupt the working process as normal safe conditions would not be respected. Work should only be restarted if the good visibility and lighting conditions are restored. Do not use the equipment if failures or damages are present.

During the working process the operator in tractor cabin must observe the following precautions:

- the tractor must proceed in straight line, avoiding abrupt movements (sudden

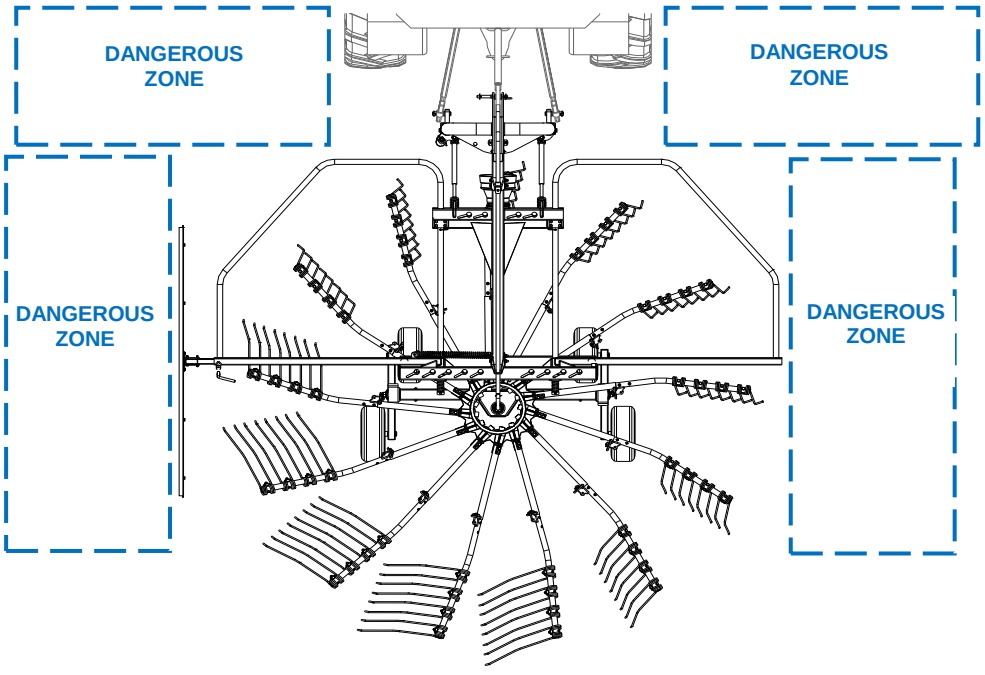
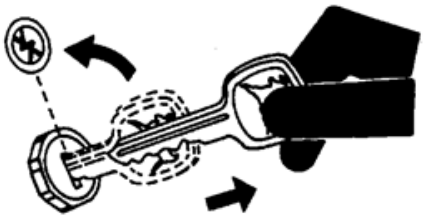


Fig.7

accelerations and/or changes of direction). **The tractor speed must not exceed the limit of 10 - 12 km/h (6.2 - 7.46 MPH);**



- **the operator in the tractor cabin must never abandon the tractor leaving its engine on.** Even for short working breaks, they must always stop the tractor, switch off its engine and remove the ignition key from the dashboard;

- during working breaks, the operator must never allow non-authorised/qualified personnel to replace him;

- before reversing with the tractor or for changes of direction at the end of the field, the operator must always verify that the windrow rotary rake is not in working configuration and that its teeth are lifted at least 30 cm from the ground. For the **mounted** type, all the equipment must be lifted by using the tractor hydraulic lift, whereas for the **pull-type** the entire frame must be lifted, by hydraulic drive, controlled by one of the tractor circuit levers from the cabin (see also paragraph D2.8 Change of direction or in reverse). The equipment may be seriously damaged if the tines are not lifted;

- the rake operation does not produce enough noise to allow the use of the acoustic protections (earplugs, earphones, etc.), instead the tractor can produce it. Therefore, consult the use and maintenance manual of the tractor;

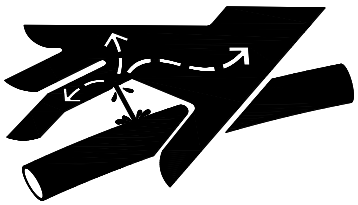
- vibrations produced by the equipment that reach the operator are of low intensity and have a frequency that result lower than levels tolerated by human body. **However, it is important to keep transmission bodies and gears always lubricated. It is also important to often verify that screws are always tighten to avoid excessive vibrations.**

Stop immediately the working process if:

- it is near to resistant objects, such as drains, wells, shafts, etc., as the contact may break the teeth, which pieces can be projected around at a very high speed;

- noisy vibrations coming from the equipment are felt. To avoid any damages, stop the tractor, disengaged the PTO, switch off the engine, and, if feasible, detect and remove the inconvenient by observing the safety regulations;

- on the **pull-type** model oil leakage is detected. Do not seek the leakage with bare hands, but by using a cloth or protection gloves. Under pressure oil may penetrate in the skin causing serious infections.



B.4 Reasonably foreseeable misuse and limit of employ

A different use from that one described in the previously paragraph **is considered improper and therefore forbidden.** In addition, the technical characteristics of the equipment must not be modified in any way to alter its performance. **In this case, both the equipment warranty and the Manufacturer liability would immediately become void**

Visibility: in conditions of insufficient visibility (fog, dust, smoke or other): it is advisable to stop the tractor and to wait until that fog, dust or other goes away. Operate at the same way in case of **rain.**

Dangerous zone: if, during the working process, a people or an animal go in one of the dangerous zone (see previously paragraph), the tractor driver must immediately stop the working process and provide to distance the intruder. At the same way, during the adjusting and/or maintenance tasks, the outsiders must not stay or move in the proximity of the equipment.

Do not use the equipment if:

- the material to cut is humid or wet. In these conditions, it becomes sticky and it easily gather on the tines affecting the operational function;

HAZARD

- **Its operation must take place nearby masonries. In these cases, besides the possibility to damage the tines, a dangerous projection of relative residuals may occur as well;**

For any doubt concerning the use of the windrow rotary rake and not mentioned in this manual contact directly the Manufacturer.

B.5 Responsibilities of the operator

Each operator becomes liable for the damages caused to themself, others, animals or damages to the things if they proceed with an incorrect use of the equipment and/or not conform to the instructions contained in this manual. Consequently, **the responsibility of the Manufacturer would immediately be void if the operator:**

- use the equipment in improper or incorrect way;
- use the equipment under the effect of alcohol, medicines, drugs or if tired or sick;
- has not been property trained or has not read the operator instructions in this manual;
- does not respect the current road laws;
- not having previously verified the required requirements, the coupling of the equipment to the tractor is not suitable (different power or characteristics to the those ones indicated in the table of the technical data);
- has not performed the foreseen maintenance tasks;
- has modified the equipment;
- has used non original spare parts or not right for the model.
- do not wear radio or music headphones while operating machine;
- wear close fitting clothing and safety equipment appropriate to the working process.

B.6 Safety labels

In addition to the instructions contained in this manual, adhesive labels have been applied on various parts of the equipment to help operators. These labels illustrate the safety rules that should be observed.

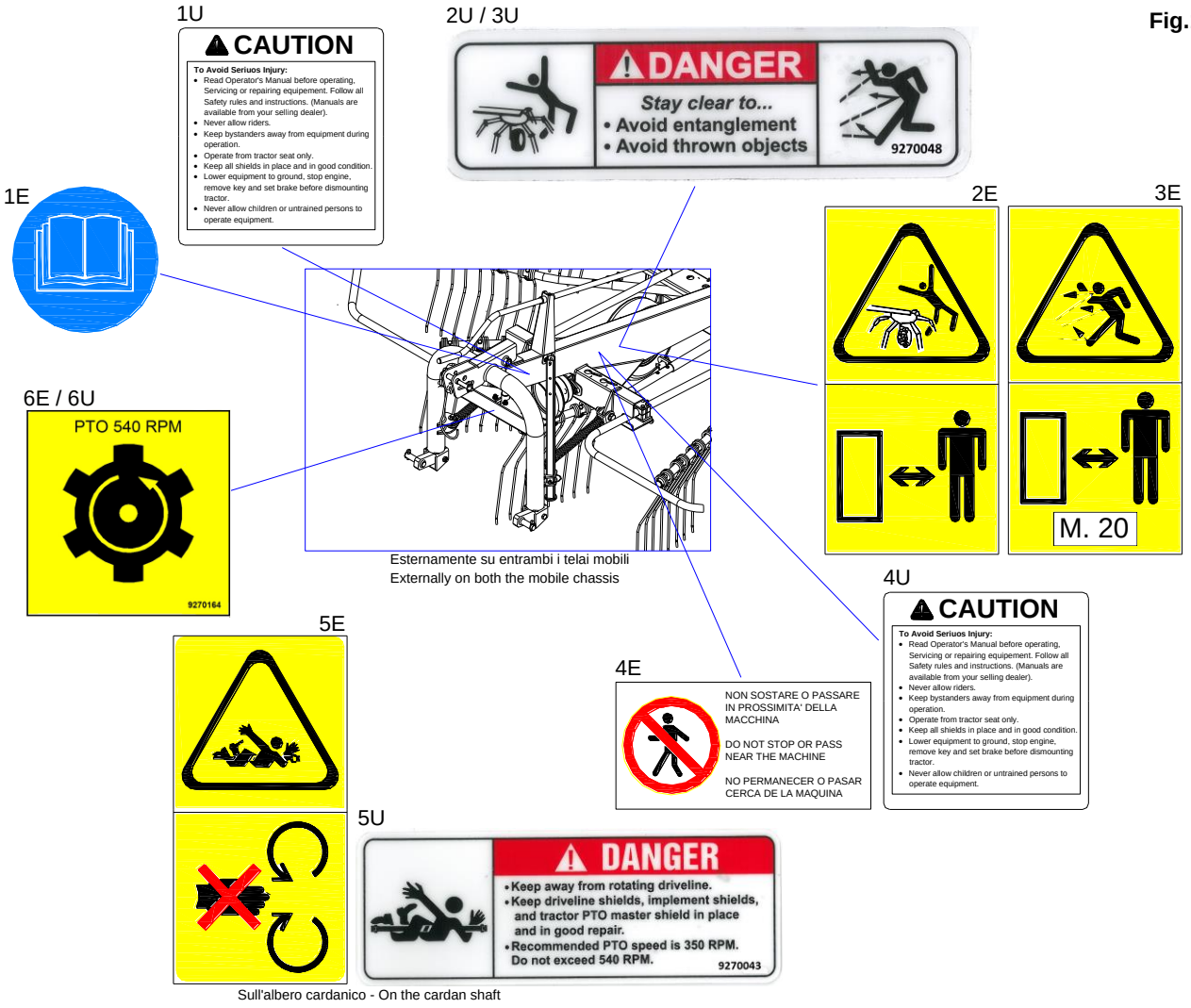


Fig.10

The shape and colour of the labels vary based on the rules. In addition to containing a danger or prohibition sign, other rectangular labels provide additional information about the safety rules that must be observed. The rules illustrated by the labels affixed to the equipment (**fig.10**) are as follows:

1U - obligation to read the use and maintenance manual;

2U / 3U - danger of hooking or entanglement. With rotating arms, their tines may hook on to clothes or other objects worn by personnel in charge;

2U / 3U - danger of flying objects. Objects presents in the operational field may be caught and thrown by the tines. Keep a safety distance of 20 m.;

4U - prohibition to stand or transit. It is forbidden for persons not in charge to stand or move inside the operational area of the windrow rotary rake, when this is running. Should it be necessary to move inside the operational area, keep a safety distance (20 m). Whereas, when the rake is in transport configuration, it is better to do attention to the tines, which being in lifted position and then sticking out should be a danger for who transit near the equipment;

5U (on cardan shaft) - danger of hooking or entanglement. With the rotation of the shaft, clothes or other objects worn by staff may be hooked ;

6U - verify that the rpm number set at the tractor PTO output is of 540 rpm/min and that it rotates clockwise.

IMPORTANT

The safety and instruction labels must be replaced before they become illegible. If this happens, the operator cannot use the carted wheel rake until a new label is applied. Similarly it is utterly forbidden to remove the safety or instruction labels placed on the machine. In any circumstances in which this occurs the Manufacturer disclaims all responsibility because the machine would not meet the safety standards with which it was designed and manufactured.

The labels similar to these present on the equipment are available from the Manufacturer. Call the Customer service of H&S Dealer to ask for replacements. It is advisable, during the equipment delivery verify the presence and the status of the labels.

B.7 Noise levels

The device produces little noise other than that of its moving mechanical parts and has no motor. Therefore, the operator does not need any acoustic protection (ear plugs, muffs, etc.). As for the noise produced by the tractor, to consult the proper operator's manual.

B.8 Residual risks

- Injury of lower limbs and/or bodily: loss of stability when parking caused by the missed installation of the bearing foot.

C. INSTALLATION

C1 Preliminary information

The **pull-type** windrow rotary rake can be installed on any agricultural tractor provided with towing hitch and rear auxiliary hydraulic couplings; whereas the **mounted type** can be installed on any tractor provided with rear universal 3-point hitch and of coupling and hydraulic lift. For the intervention the equipment must be placed inside an area with flat surface, arranged for the installation. The operator performing the intervention must be aware of the relative safety regulations and must work with the utmost attention and caution.

C2 Installation to tractor

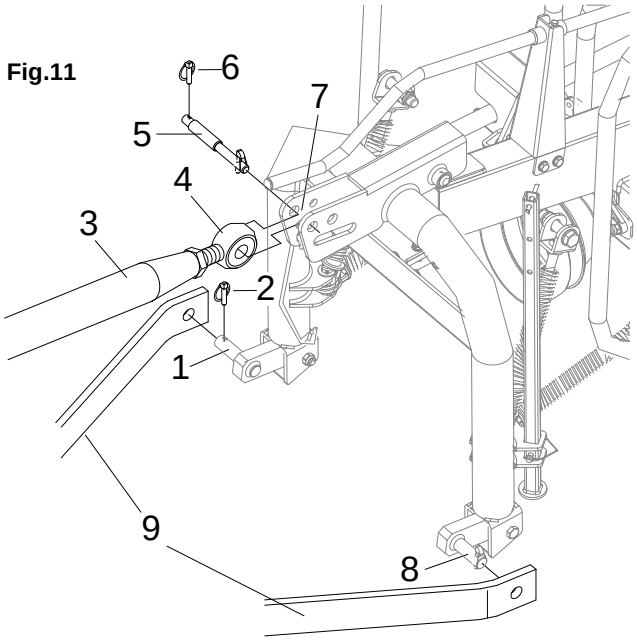
- **Mounted type (fig.11):** the operator must slowly approach the tractor to the windrow rotary rake, positioning it so to facilitate its centring.

IMPORTANT

The holes in the tractor attachment must be aligned with those on the rake attachment with maximum care and attention.

Once the manoeuvre is completed, the operator stops the tractor, leaves the lift in low position, engages the parking brake, in case disengages the heavy pull, removes the ignition key from the dashboard, gets off of cabin and works as follows:

Fig.11



- inserts lift arms (**9**) in the appropriate housings (low pins **1** and **8**) on the frame of windrow rotary rake (**6**) and blocks them, one by one, by using safety pins (**2**);
- (should it not be present on the tractor) places the adjustable tie-rod (**3**) in the appropriate housing of the tractor 3rd-point ("heavy pull" hole) and then fastens it to the tractor by using the provided pin;
- loosens or tightens the tie-rod body of the windrow rotary rake, leaving volute (**4**) free, until it coincides with the housing on equipment frame (**7**);
- fastens the tie-rod with pin (**5**), which subsequently blocks with safety pin (**6**);

IMPORTANT

Insert the pivot 5 only in one of the hitch holes and NOT in the slotted one. The pivot necessarily must to be inserted in the slotted hole alone if the equipment is equipped with front wheel.

- once performed these operations, the operator gets on the tractor and lifts the equipment by activating the hydraulic lift lever and supported by another operator from the ground, until the PTO has the same height of the tractor. Afterwards, stops the tractor again, blocks the hydraulic lift lever and adjusts the tie-rod (by acting on his body), until the frame of the windrow rotary rake is perfectly vertical, then he tightens the lock nut;
- blocks the arms of the hydraulic lift with the tie-rods or chains they are equipped with.

Once performed the centring, the same operator lifts bearing foot (**12 - fig.12**) in a more suitable and safe position, both for the

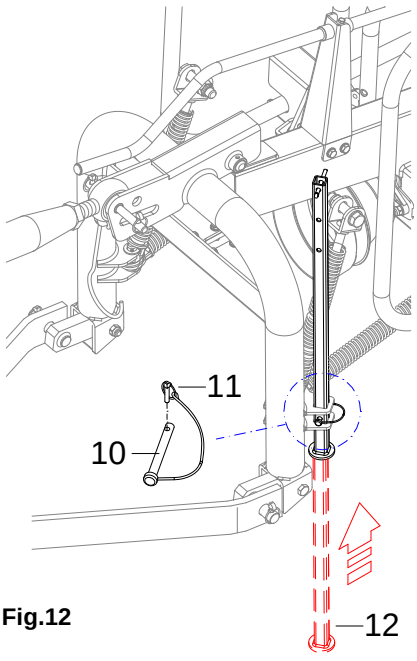


Fig.12

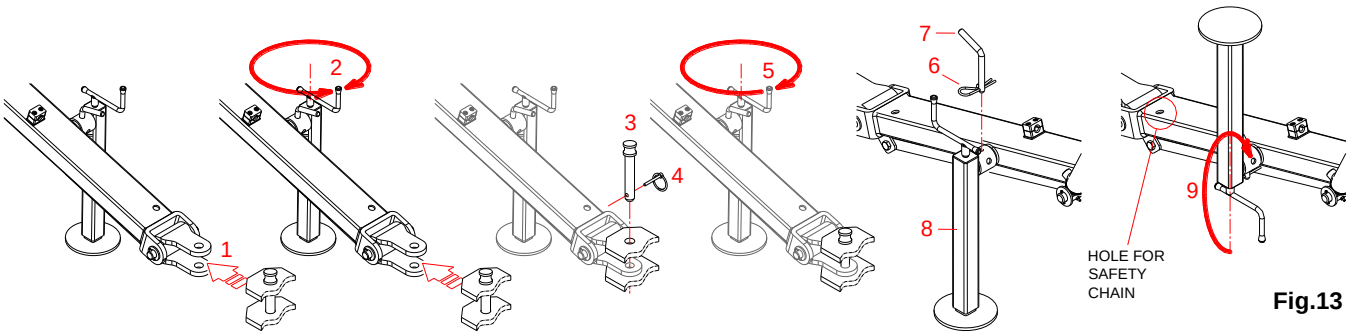


Fig.13

transport phase and for the subsequent working phase. For this lifting, the operator removes pin (**11**) to release locking pin (**10**) and then removes the latter from the foot holes. He lifts the foot up to the lowest hole, as indicated in the figure and tightens it with the locking pin and relative pin.

Cardan shaft: for the instructions concerning to its installation and adjustment consult to its use and maintenance manual.

- **Pull-type (fig.13):** the operator must move the tractor slowly to a position where the joints can be easily aligned (**1 - fig.13**).

IMPORTANT
The holes in the tractor attachment must be aligned with those on the rake attachment with maximum care and attention.

When the tractor is near the rake hitch, turn the lever on the bearing jack (**2**) to raise or lower the rake hitch and bring it parallel with that on the tractor. You can then insert the locking pin (**3**) through the respective holes in the attachments, as shown below, and secure it in place with the respective safety pin (**4**).

Next, turn the lever (**5**) on the bearing jack to raise the latter as high as necessary to move it from its position to that required for trailing the rake.

To move the jack (**fig.13**): remove the R pin (**6**), take out the handle pin (**7**) and take the jack out of its housing (**8**). Next, turn the jack counter-clockwise (**9**) as illustrated and re-insert it in its housing. Insert the handle pin in its new housing and fasten it with its respective R pin.

Note: *near the tow hitch there is a hole where to connect the safety chain, which must be successively fastened to the tractor. The application of this chain is not mandatory in Countries members of the European Union, however it is in other Countries, as U.S.A..*

C3 Installation and adjustment of cardan shaft

- **Installation:** strictly observe instructions relative to installation indicated in its own use and maintenance manual.

IMPORTANT
Before installing the cardan shaft, verify that this has the requisites required for the type and power to transmit according to the rpm of the PTO. If required, verify also the tractor use manual.

Should this not be used, is saying not installed on the PTO of the tractor but only on the windrow rotary rake one, lay the cardan shaft on the support located on the **mounted type** or on the towing bar of the **pull-type**.

- **Adjustment:** the cardan shaft (both provided with the equipment and sold as accessory) has a standard length. So it must be adjusted to the tractor where the windrow rotary rake is installed. For this operation, proceed as follows:

  - remove protection devices from the cardan shaft;
  - remove the two parts that make up the shaft and join a part to the windrow rotary rake PTO, by clicking the spring safety pin and the other part to the tractor PTO, by clicking the spring safety pin as well;
  - place the two parts of the cardan shaft beside and find the minimum sliding length (**L**). Should the shaft be too long, shorten the two external plastic protection pipes, which must have the same size, and then the internal metallic ones. Smudge the cut parts and lubricate the internal parts.

IMPORTANT
When the cardan shaft is pulled out at its maximum, the two pipes must overlap for at least 15 cm. When it is inserted at its maximum, the minimum gap allowed must be 4 cm.

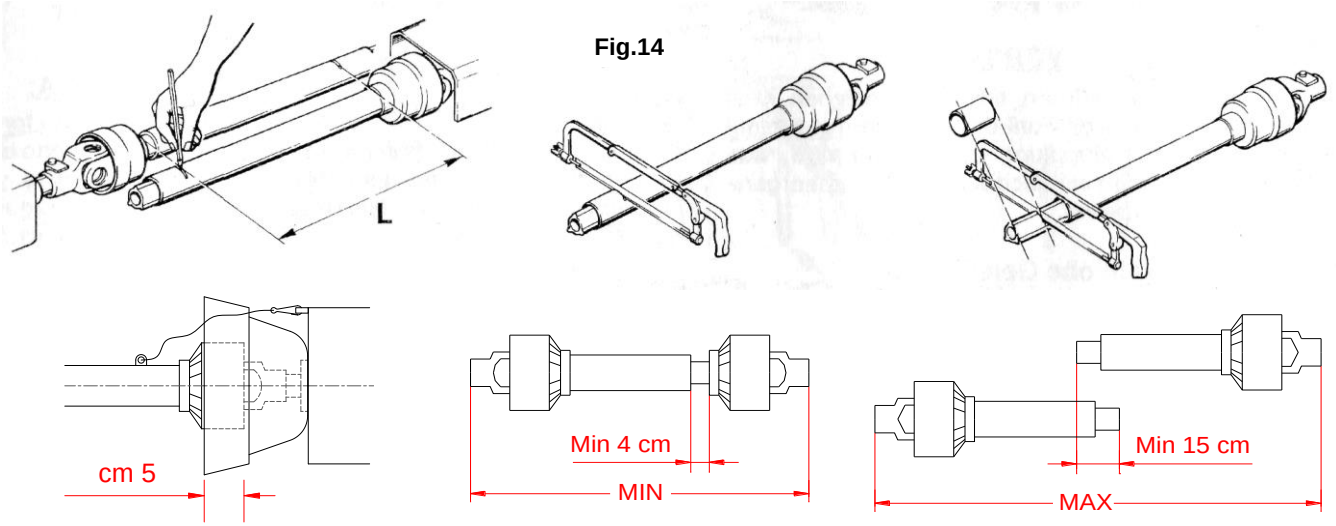


Fig.14

remove the two parts of the cardan shaft from their connections (on the tractor and windrow rotary rake) and assemble the shaft, by placing a part completely inside the other;

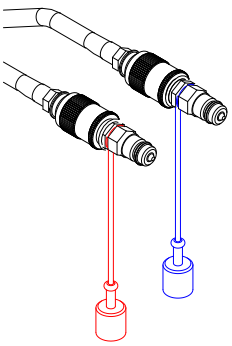
- join again the two ends of the cardan shaft to the relative PTO by clicking the relative spring safety pins;

- block the protection pipes by using appropriate chains to prevent their rotation both on the tractor and on the windrow rotary rake. The overlap between guard and cardan shaft must not be lower than 5 cm.

Now, without activating the tractor PTO, all the equipment can be transported to the place of use.

Note: *by using the equipment on another tractor requires the adjustment of the cardan shaft. Proceed following the instructions indicated in this paragraph.*

C4 Hydraulic hoses



The adjustment of the tines in relation to the ground (which implies lowering and lifting the entire frame, including the work rotating unit) is determined by the retraction and extension of the two appropriate hydraulic cylinders. These are powered by the tractor auxiliary circuit and so controlled by a lever, located in the cabin. Thus, the tine adjustment cannot be carried out if previously the jack pipes (provided with quick coupling, as indicated in the figure) are not connected to the correspondent connections of the tractor auxiliary circuit.

C5 Removal

To remove the rake from the tractor, follow the above instructions in reverse order. The hydraulic connections have to be removed before the rake.

WARNING

Before removing the hoses, remove the hydraulic pressure inside the circuit by acting the corresponding lever in cabin.

C6 Storing the rake

The Customer must set aside a large and easily accessible area on his premises where the rake can be stored. How to store the rake:

- if not already done, have the windrow rotary rake assume the work configuration;

- park the equipment in a safe and isolated place, on a flat and consistent surface;

- **mounted type:** using the tractor hydraulic lift, rest the equipment on the ground;

- if not already done, adequately position the support foot for the parking phase;
- remove the tractor from the windrow rotary rake;

- protect the equipment with a sheet.

D. OPERATION and USE

D1 Working configuration

The windrow rotary rake will be driven on to the work place, according to the regulations described in paragraph B2 and before using the equipment, the operator will perform the following interventions:

- make certain that the PTO is disengaged;

IMPORTANT
Tractor PTO must never be engaged with the engine switched off;

- **only for the mounted type:** by activating the relative lever, lower the tractor hydraulic lift until the wheels of the windrow rotary rake touch the ground;

- switch off the tractor engine, engage the parking brake, remove the ignition key from the dashboard and go down from cabin;

- provide to put the equipment in the working configuration (**fig.17**):

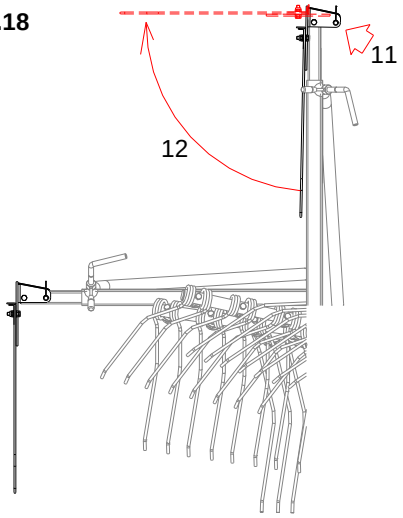
  a. one at a time, remove tine-holder arms (**2**) from the respective supports on frame (**1**) and place them in the housings on work rotating unit (**3**) to then block them by using safety pin (**4**);

  b. first on the right side and then on the left one: pull forward the side protection screen towards tractor connection (**6**), so to unhook it from the mechanical block for transportation (**5**);

  c. keeping it also pulled, rotate it downwards, as indicated in figure (**7**), and release it only when the same is placed on the frame so to be blocked by its relative work mechanical block (**9**). When the screen (**8**) is released, appropriate spring (**10**) will take it back to the initial position;

  d. on the left side, before lowering completely the protection screen, open the side deflector (**fig.18**). Therefore, remove the safety pin from the pin that blocks the deflector rotation. Remove the pin from its housing (**11**) and rotate deflector (**12**) of 90° upwards, as indicated in the figure. Complete lowering the side protection screen. **Note:** *on this side of the windrow rotary rake, the mechanical block is not set. The side deflector weight keeps the screen position during the process;*

Fig.18



  e. make certain that the bearing foot is in a safety position. It must be already in this

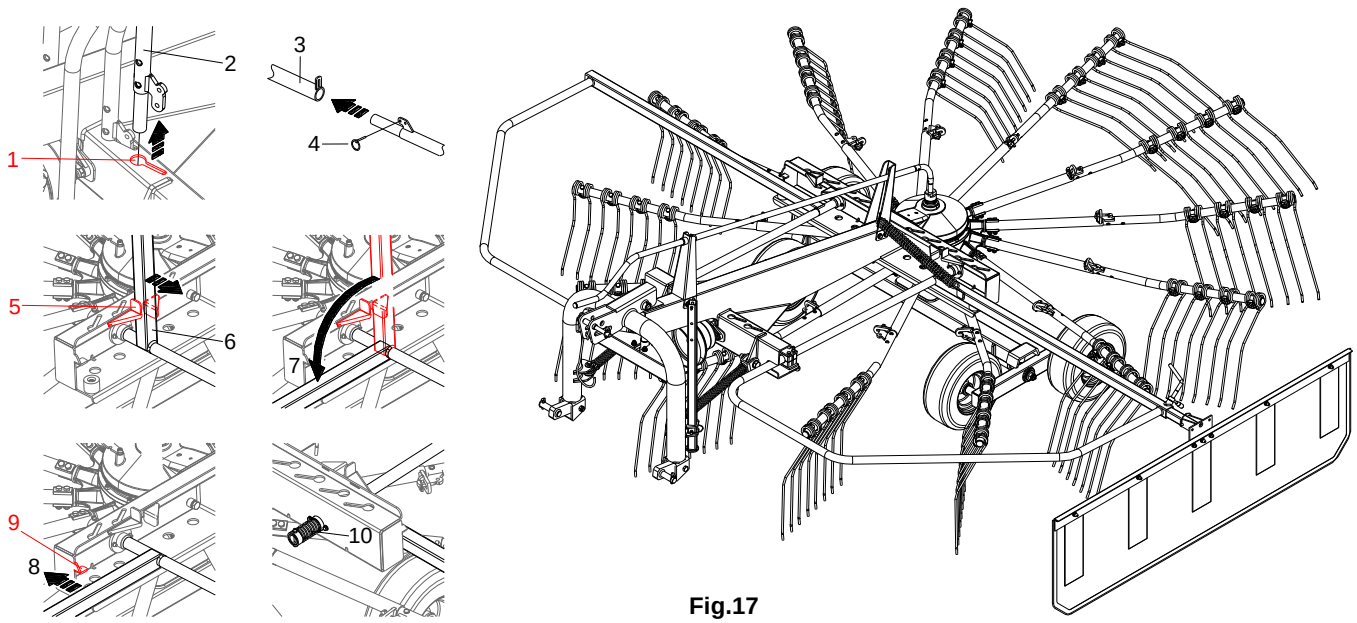
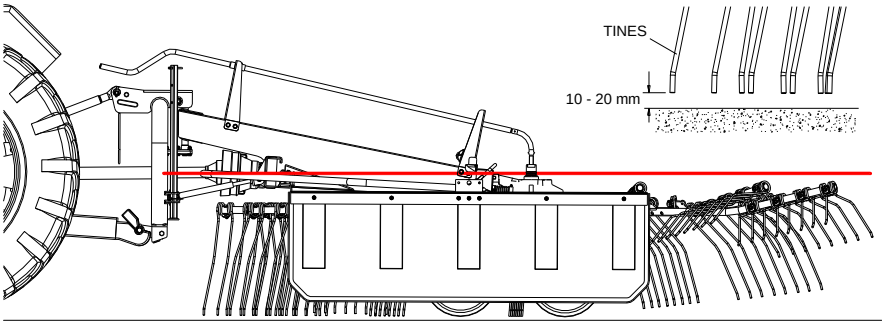


Fig.17

Fig.19



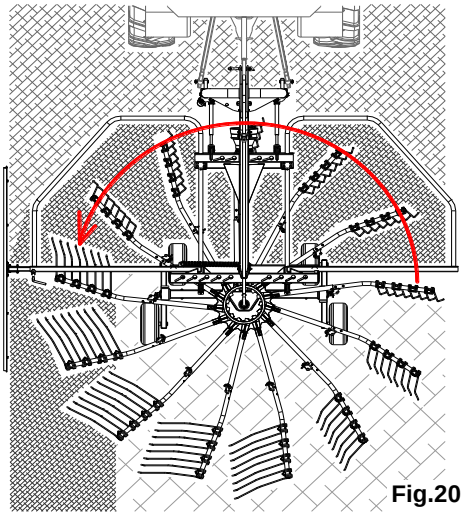


Fig.20

position, because this intervention completes the installation of the windrow rotary rake on the tractor. Should it not be, follow the related instructions indicated in paragraph C2 Installation to tractor;

- make certain that there are no persons or animals within the action range of the equipment, otherwise move them away;

- get up on the tractor, start the engine, disengage the parking brake and engage the PTO.

D2 Working process

Harvesting process starts when the tractor moves forward and with the work rotating unit in operation. By brushing the ground, tines scrape the surface and collect the cut forage, forming a left side windrow, which is regular and even, as indicated in the **fig.20**. In order to obtain a satisfying result, the windrow rotary rake must work in parallel to the ground and tine adjusted at a distance of 10 ÷ 20 mm from the ground (**fig.19**). Instead, the side deflector position determines the windrow width.

Proceed for some meters and then verify the process result. Should the operator require one or more adjustments, follow the instructions indicated in the relative paragraphs.

IMPORTANT

Except when otherwise written, all adjustments must be performed with the tractor engine switched off, PTO disengaged, parking brake engaged and ignition key removed from the dashboard.

D3 Adaptation of the parallel windrow rotary rake to the ground

Perform this adjustment if the equipment does not work in parallel to the ground.

- **Mounted type (fig.21):** to perform such adjustment, activate the adjustment tie-rod, located between the tractor and the third section of the windrow rotary rake, by loosening or tightening its body and manoeuvring the appropriate lever, as indicated in the figure. By rotating the lever counter-clockwise (direction **A**) the tie-rod extends, pushing the equipment frame downwards. By rotating the lever clockwise (direction **B**) instead, the tie-rod shortens, pulling the frame of the windrow rotary rake upwards.

- **Pull-type (fig.22):** to perform such adjustment, activate the front jack, located between the towing connection and the frame, by loosening or tightening a worm

Fig.21

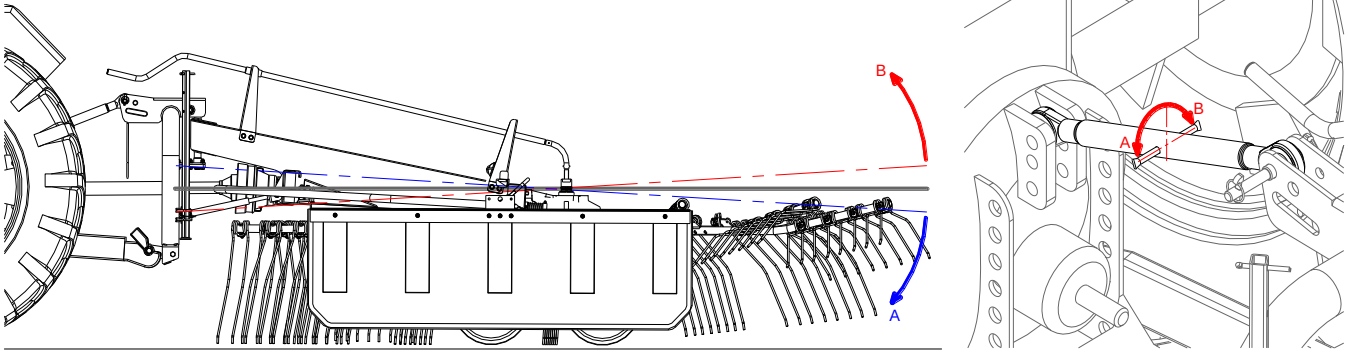
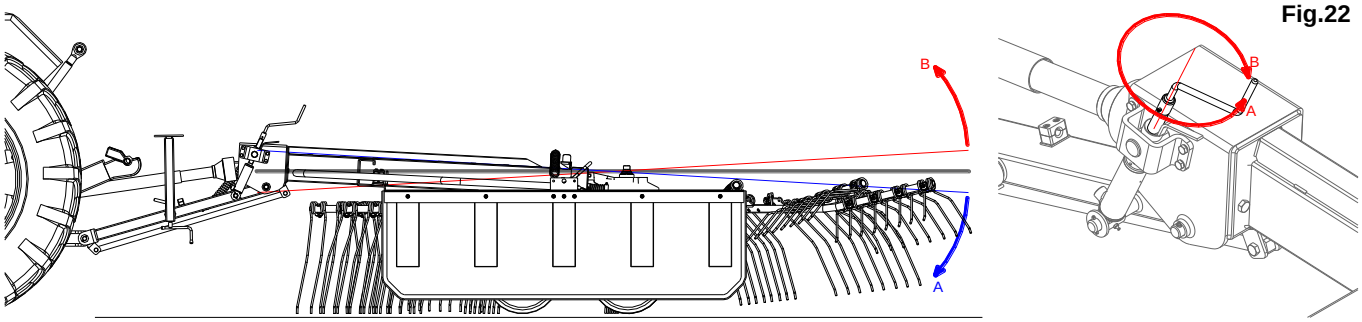


Fig.22



screw installed in it and manoeuvring an appropriate lever, as indicated in the figure. By rotating the lever counter-clockwise (direction **A**), the equipment frame lowers, whereas by rotating the lever clockwise (direction **B**) it lifts

D4 Adjustment of the windrow tine distance from the ground

- **Mounted type (fig.23):** to lower the tines and so reduce their distance from the ground, rotate counter-clockwise the appropriate handle (**B**), located nearby the third section, as indicated in the figure. If they touch the ground, they must be lifted by using the tractor hydraulic lift (**A**), activated by the appropriate lever located inside the cabin. **Note:** *in theory, to lift the tines from the ground, the handle should rotate clockwise, but in practice, the weight of the rotary unit with arms does not allow this operation. Therefore, use the hydraulic lift.*

- **Pull-type (fig.24):** to adjust the distance of the tines from the ground, adjust the position of appropriate adapter (**3**), located in its housing, under the rotary unit, as indicated in the figure. First, lift completely rotator unit with arms (1), by manoeuvring the relative tractor service lever from the cabin, and then safely block it, by placing a piece of wood or metal under it (**2**), as indicated in the fig.24, so that the unit cannot lower in any case. This application is required, because to adjust the adaptor position, an operator must work under the rotator unit. In this position, he must remove the R-pin that blocks the handle pin (**4**), extract it from its housing and place the adaptor by sliding it vertically in its housing, as indicated in the figure. The holes on the adaptor and those present in the housing are located so to easily obtain the desired height. Once the adaptor is placed, the operator inserts the handle pin again in the corresponding holes and then it blocks it, by using the relative R-pin.

Fig.23

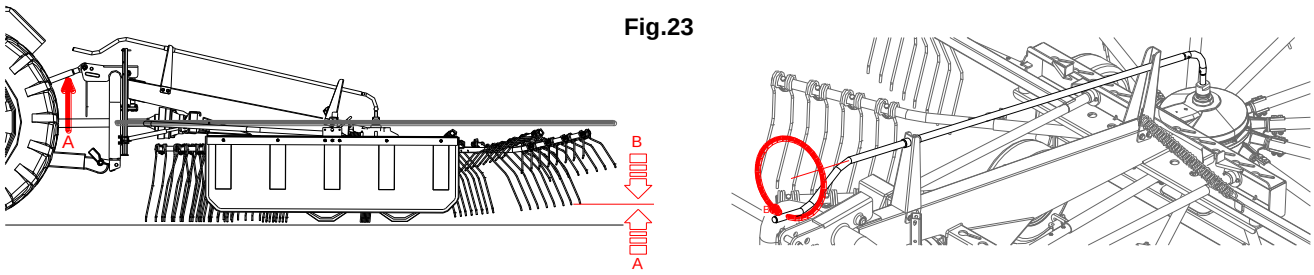


Fig.24A

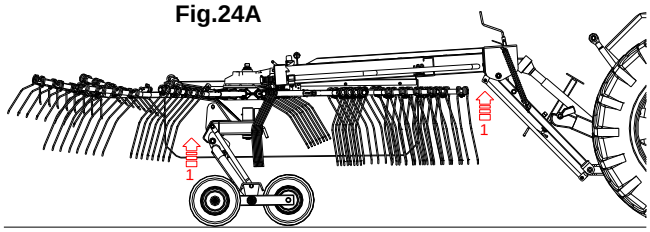


Fig.24B

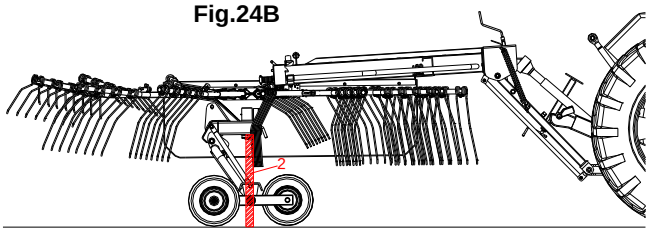
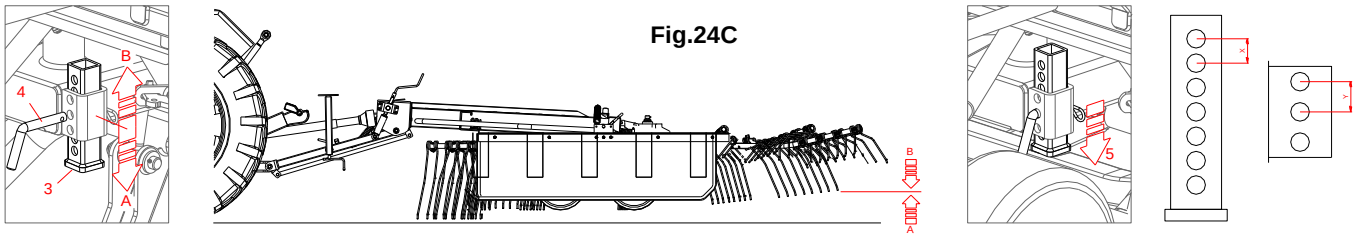


Fig.24C



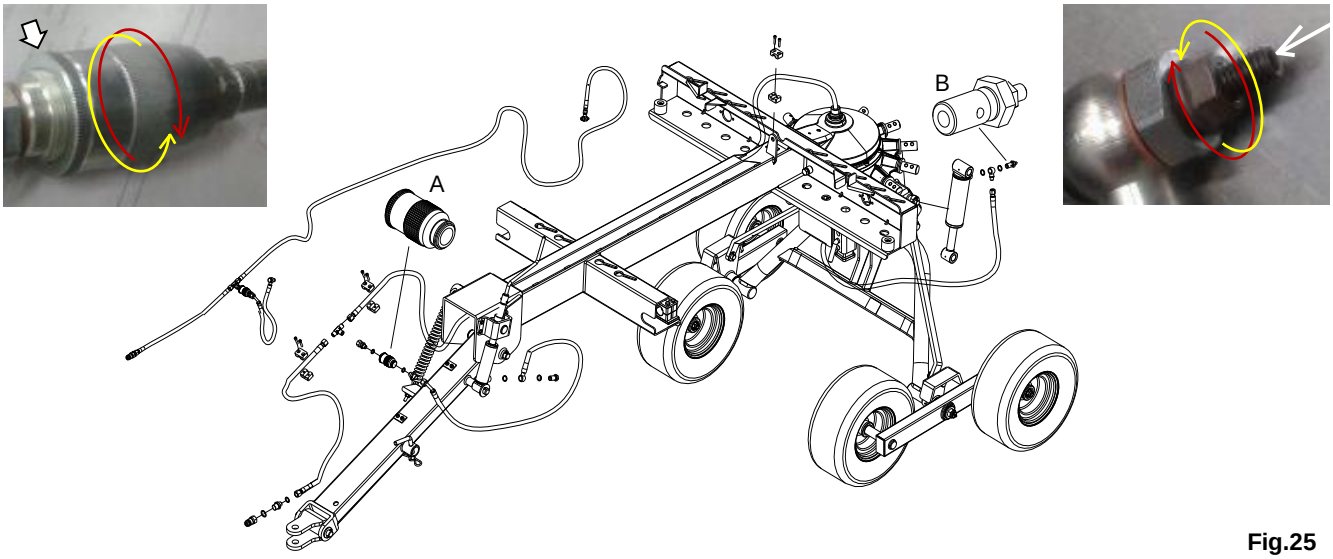


Fig.25

Then, the operator removes the safety piece of wood or metal and lowers completely the rotating unit, by manoeuvring the lever from the cabin, until the adaptor base does not touch with the wheel axle (**5**). Verify the new distance between windrow tines and ground.

D5 Adjustment of the hydraulic cylinder moving

A. Flow adjusting valve of frame (fig.25): if the lifting of the frame did not result parallel to the ground, adjust the valve by manually rotating the knurled part:

- unscrew the locking ring nut;
- manually rotate the valve toward right (+) or toward left (-);
- lock the valve in the select position by tightening the ring nut.

B. Flow adjusting valve of rotor (fig.25): if the lifting of the rotor results too much fast or too much slow. Adjust the valve by using an Allen key:

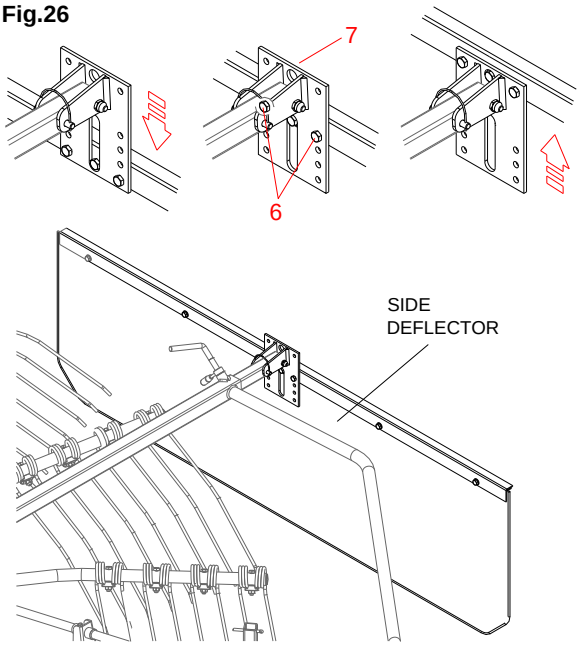
- unscrew the locking nut;
- manually rotate the Allan key toward right (+) or toward left (-);
- lock the valve in the select position by tightening the nut.

D6 Adjustment of the side deflector distance from the ground

To perform the adjustment (**fig.26**):

- loosen completely the nuts of the screws that blocks the deflector on its support;
- one by one, remove screws (**6**) paying attention not to drop the deflector;
- place the deflector drilled rod in the desired position, referring to the holes on its support (**7**);
- place the locking screws in the new holes and tighten completely the relative nuts.

Fig.26



D7 Adjustment of the side deflector range

This adjustment is performed to form a more or less wide windrow, according to the cut forage quantity. The higher this is, the wider must be the windrow, so the deflector must be placed more externally. To adjust its excursion (**fig.27**):

- first loosen locking knob (by rotating it counter-clockwise) (**9**) and then handle pin (**8**), enough to slide horizontally the deflector in its housing;
- adapt the deflector excursion to the kind of windrow desired;
- lock its support again, by tightening first the handle pin and then the locking knob (by rotating them clockwise)

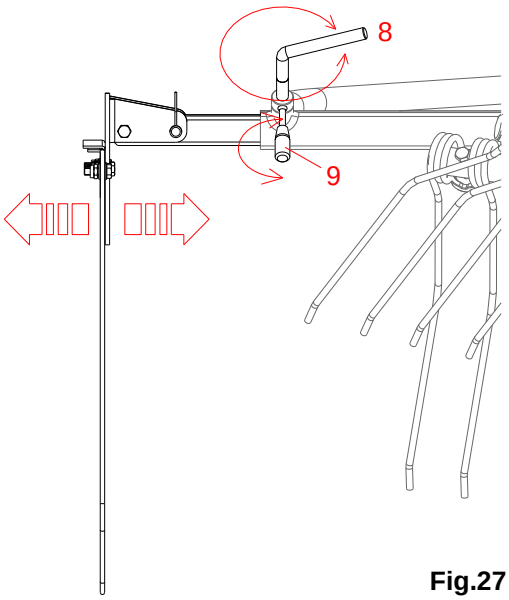


Fig.27

D8 Change of direction (U-turn)

At the end of the field, when the tractor with the windrow rotary rake must invert direction or in the event it must go in reverse for a short distance, windrow tines must be lifted from the ground.

- **Mounted type (fig.28):** all the equipment must be lifted by using the tractor hydraulic lift (**1**), until tines will be at 30 cm from the ground;

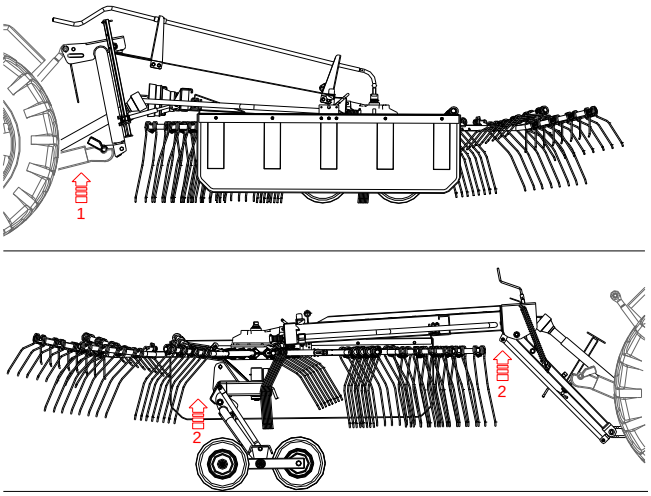


Fig.28

- **Pull type (fig.28):** the entire frame must be lifted by using the hydraulic lift (**2**), which is controlled by the corresponding lever of the tractor auxiliary circuit, from the cabin.

D9 End of the work

Once work is completed and the tractor must return in its usual parking, put the windrow rotary rake in the transport configuration, before moving.

For work breaks, even short, the operator must always:

- disengaged the tractor PTO;
- switch off the tractor engine;
- engage the parking brake;
- bring the gear lever in neutral or "idle" position;
- remove the ignition key from the dashboard.

To store the equipment, follow instructions described in paragraph C6.

E. MAINTENANCE

E1 Warnings during maintenance

The windrow rotary rake is agricultural equipment that does not require particular maintenance, or relative programs. However, a periodical intervention is envisioned (described below) that, if scrupulously carried out by the Customer, will maintain the efficiency and work ability of the equipment unaltered, preserving it from every functioning damage.

The operator, who must be an adult, qualified and trained for these interventions, must observe the following:

HAZARD

- **any kind of intervention must be carried out on an flat surface, sufficiently lighted and free from any person, animal or object that may obstruct every manoeuvre. The equipment must be stable on the ground, the tractor stopped, the parking brake engaged, the engine off and ignition key removed from the dashboard. Should lifting the windrow rotary rake be required, safely block it, by placing a piece of wood or metal under it, as indicated in the fig.28;**

- before working, for the operator's safety and to prevent damages to the windrow rotary rake, a clearly visible sign indicating "**Machine under maintenance"** must be applied on the tractor dashboard;

- the interventions, maintenance and repair, once started must always be completed and never post-poned;

- he must not work on memory, but always read the instructions in this manual and accurately follow them;

- the use of equipment to perform the maintenance interventions is subject to the relative accident-prevention regulations. However, do not use the equipment improperly like, for example, using petrol to cleanse or pliers instead of an adjustable wrench.

Once maintenance or repair has been completed, clean the area from water, oil, grease, oily cloths, tools or other material.

E2 Maintenance tasks

The times of intervention are merely for informative purposes and relate to normal conditions of use. They can therefore vary in relation to the type of service, the work environment (more or less dusty), seasonal factors, etc. The harder the functioning conditions of the equipment, more interventions are required.

Other maintenance tasks to be performed weekly (or after about 40 operating hours) are:

- grease top-up, by using an appropriate pump, in all grease nipples present on the equipment and identifiable by means of the adhesive labels, as shown at the side, applied near-by. Grease MU EP 2;

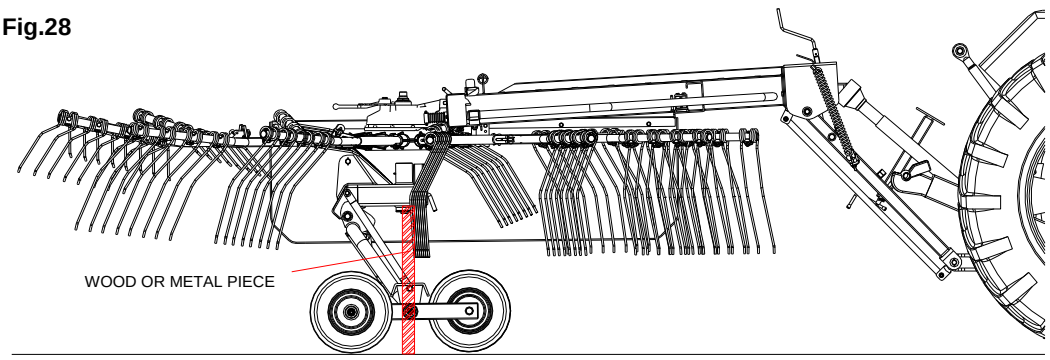
- check the fastening of nuts and screws blocking the various equipment parts;

- check the presence of the various safety pins and R pins blocking the various equipment parts;

- verify the structural integrity of all equipment parts, in particular those subject to wear like, for example, the tire wheels;

- **pull-type:** verify that all components of the hydraulic system do not leak.
  Note: *both windrows rotary types are equipped with work rotating unit operating in oil bath, this means that all components of*

Fig.28



the rotor are dipped in lubricant. Without oil, they are exposed to rapid wear and so to cam binding. Therefore, should leakages occur, verify its internal oil level. To verify this, loosen the level plug, placed at the head side and indicated in the figure. Should the oil not reach the lower part of the hole, its quantity is considered inadequate and so it must be filled up through the same hole until the oil will not escape. Use only ***ISO VG 320 (ENI BLASIA 320) gear oil (****CINCINNATI MILACRON | DAVID BROWN S1.53.101 (5E) | DIN 51517 Parte 3 - CLP | ISO L-CKD | U.S. STEEL 224).*

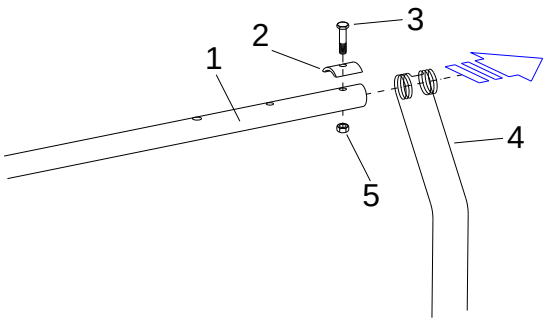
Fig.29

IMPORTANT
To avoid polluting, it is forbidden to disperse oil, lubricants, filtering cartridges or other toxic materials in the environment. Scrupulously comply with the current dispositions for the disposal of liquid and solid substances.

- regarding operations on the cardan shift, consult to its use and maintenance manual.

E3 Replacement of window tines

Should the replacement of a pair of windrow tines be required (for wear or damage), loosen locking nut (**5**) completely, remove fixing screw (**3**) with relative tie-tine plate (**2**) from its housing and then remove tine pair (**4**) from the arm of equipment (**1**). Place the new pair and fix them by following removal instructions in reverse.



E4 Troubleshooting

FAILURE OR INCONVENIENCES	CAUSES	SOLUTIONS
Pull-type: hydraulic cylinders move jerkily	Air in the hydraulic circuit	Run the windrow rotary rake in vain for a few minutes to drain the air in the hydraulic circuit. Also verify the hydraulic oil in the tractor tank
Pull-type: a jack moves without the command for its activation	Jack gasket worn	Replace gaskets
Partial or inadequate forage harvesting	Windrow tines too distant from the ground	Adjust windrow tine distance from the ground (see paragraph D2.4)
Rapid wear of windrow tines	Tines a constantly touching the ground	Adjust windrow tine distance from the ground (see paragraph D2.4)

E5 Machine demolition: disposal of materials

When the windrow rotary rake is placed out of service, the parts that might become dangerous for persons, animals and environment must be made harmless, if dispersed. The equipment materials, which are subject to a separate disposal are:

- iron
- lubricant oil
- rubber

The disposal of the above materials must be carried out respecting the legal dispositions in force in each individual Country.

Note:.....

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