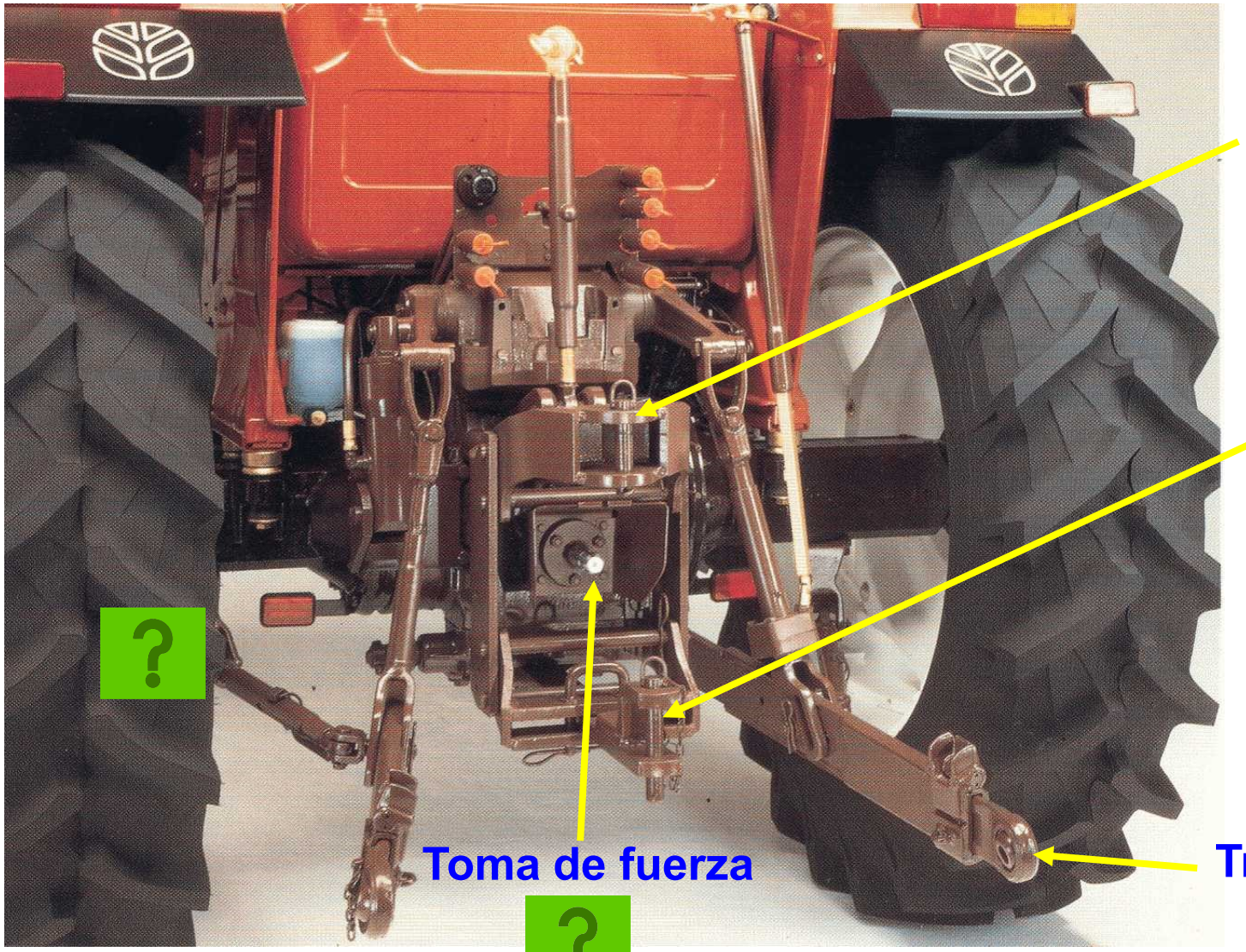
# Enganches y tomas de potencia

**Prof. Luis Márquez**
**Dpto. Ingeniería Rural**

Luis Márquez

# Enganches y toma de fuerza

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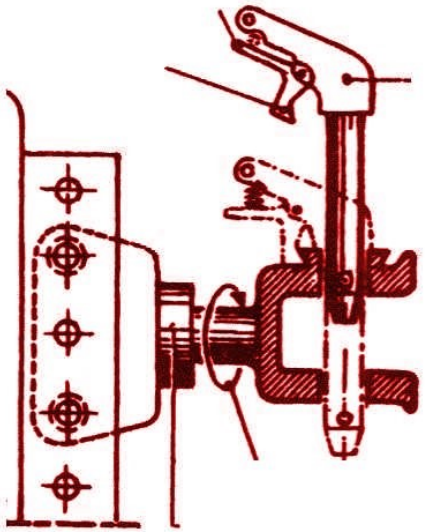
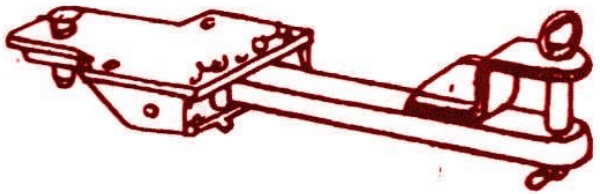
# Enganche en un punto





**La resultante de las fuerzas debe de pasar por el punto de enganche**

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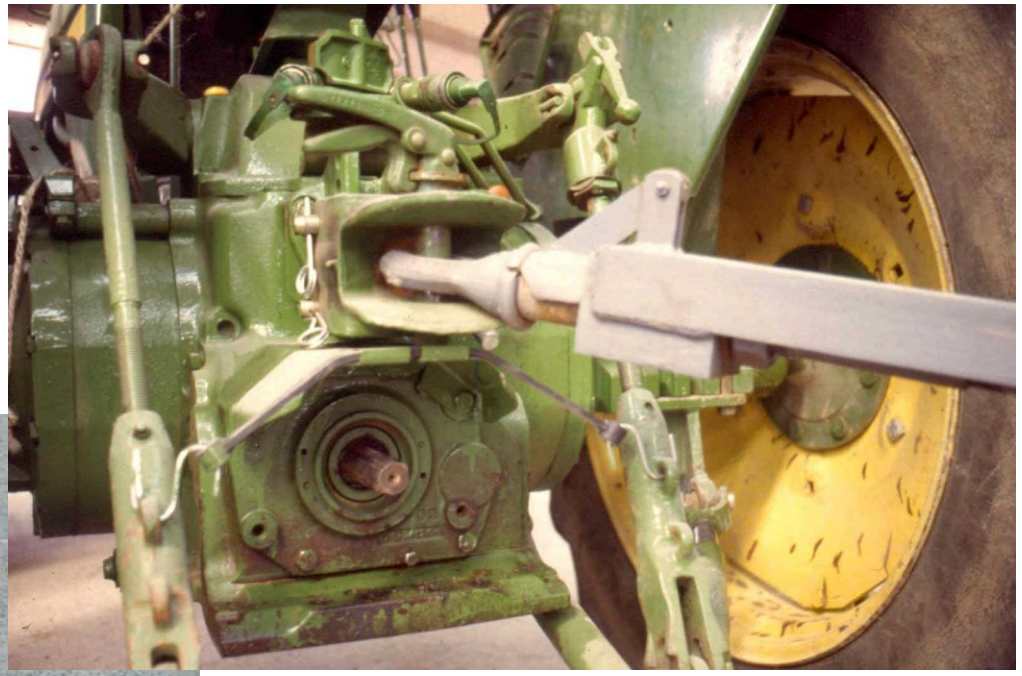
# Boca y anillo



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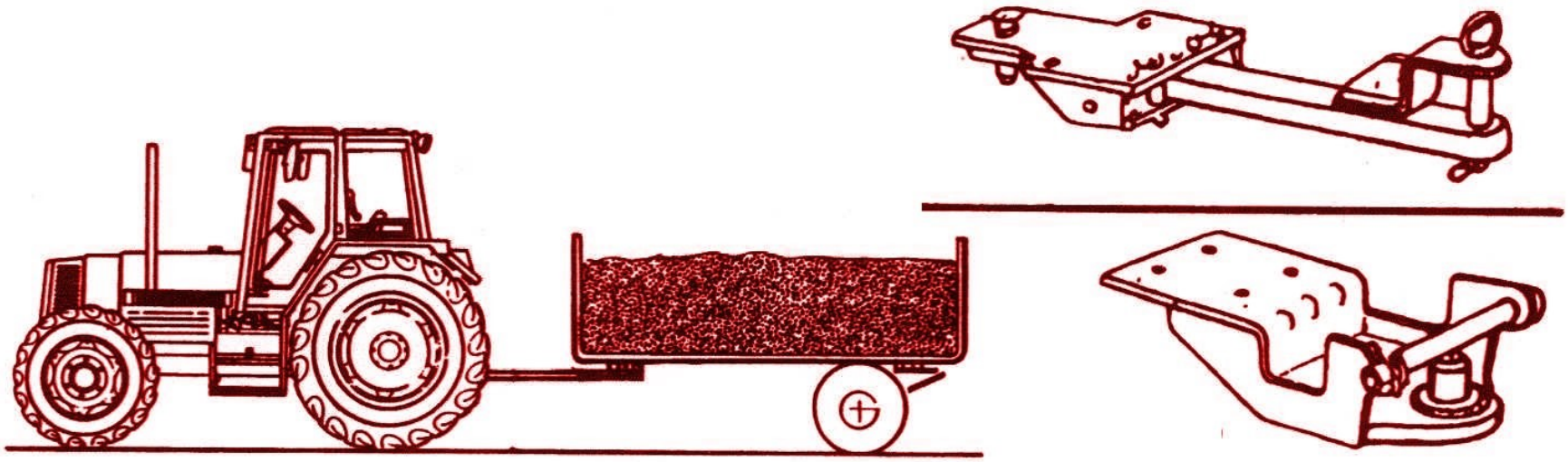
# Enganche en un punto que admite carga vertical



**Condiciones de estabilidad**

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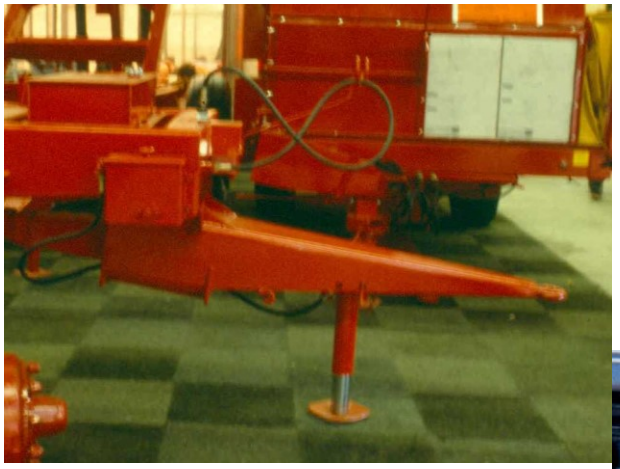
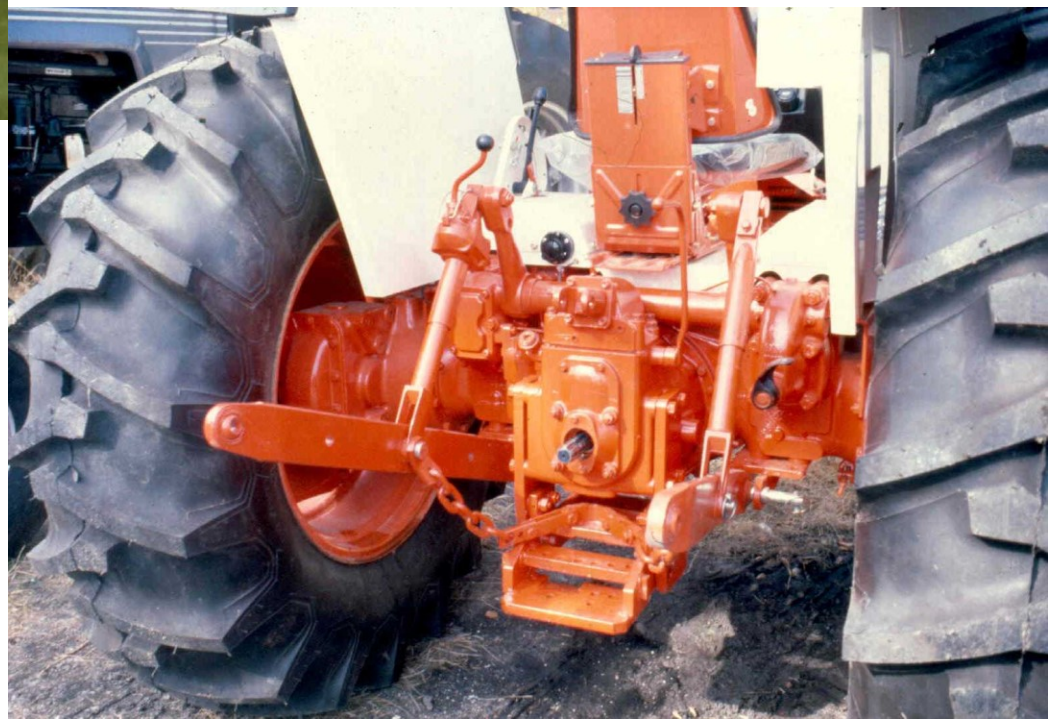
# Anillo sobre pivote o gancho





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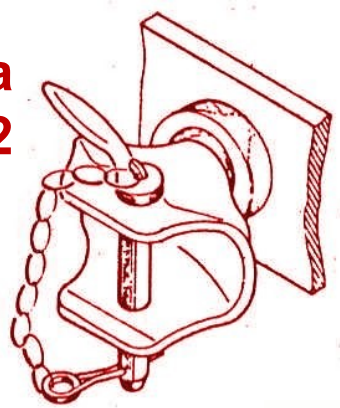
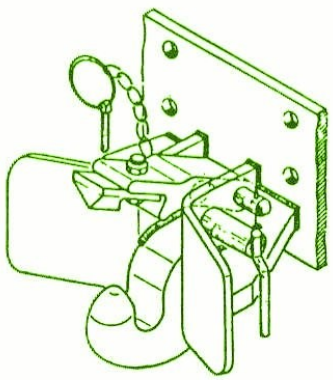
# Enganches mecánicos
## (UNE 68067 – Terminología)

***Para remolques y máquinas asimilables***

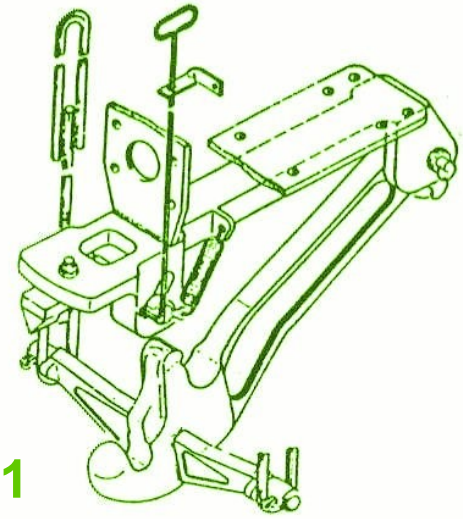
**boca**
**ISO 6489-2**



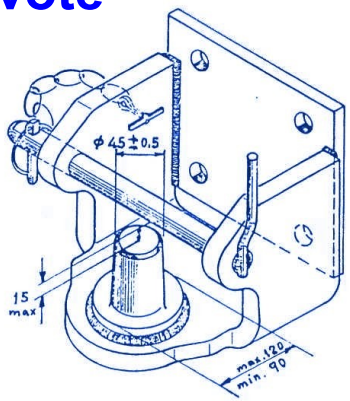
**anillo**



**gancho**
**ISO 6489-1**



**pivote**

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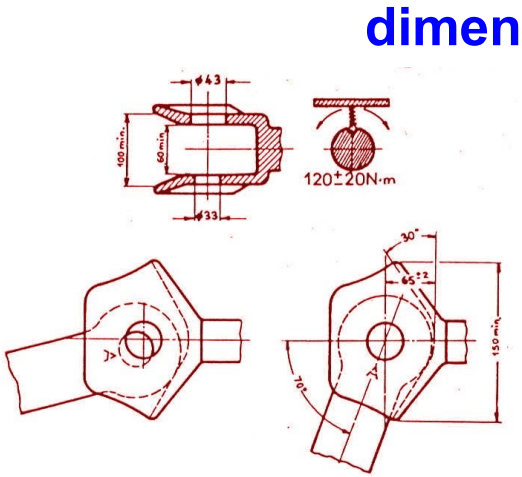
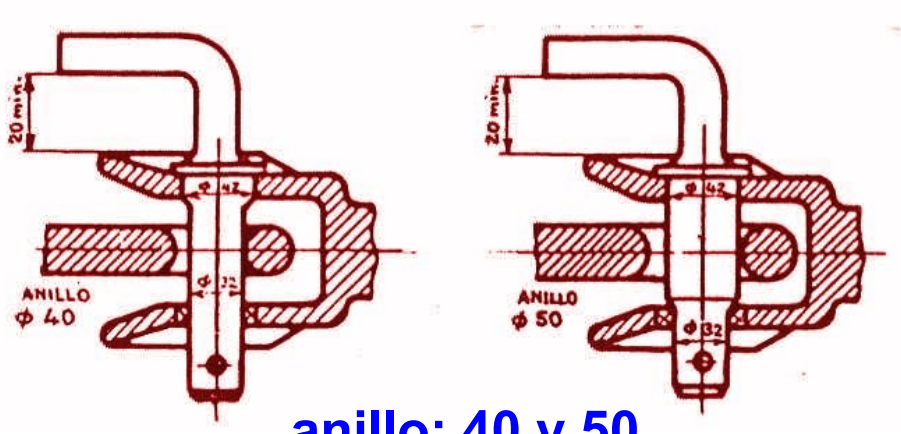
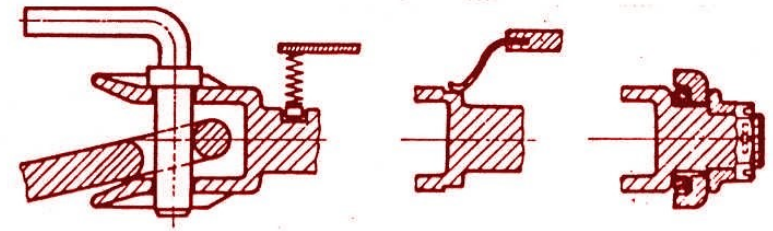
# Compatibilidad de acoplamiento
## (UNE 68031)

**dimensiones**

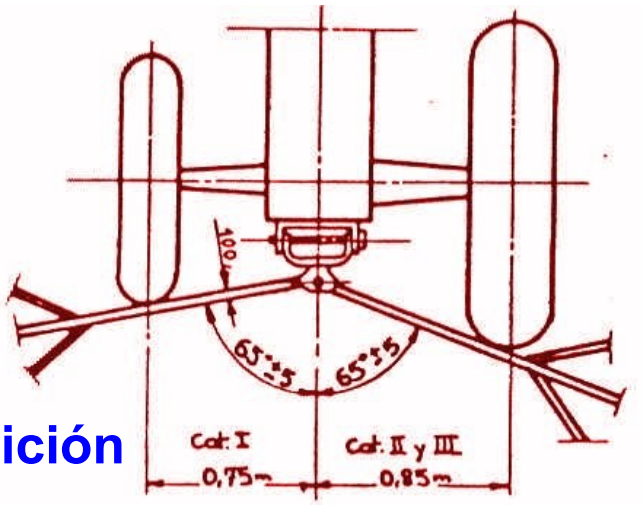



**anillo: 40 y 50**



**seguridad: 120±20 Nm**




**posición**

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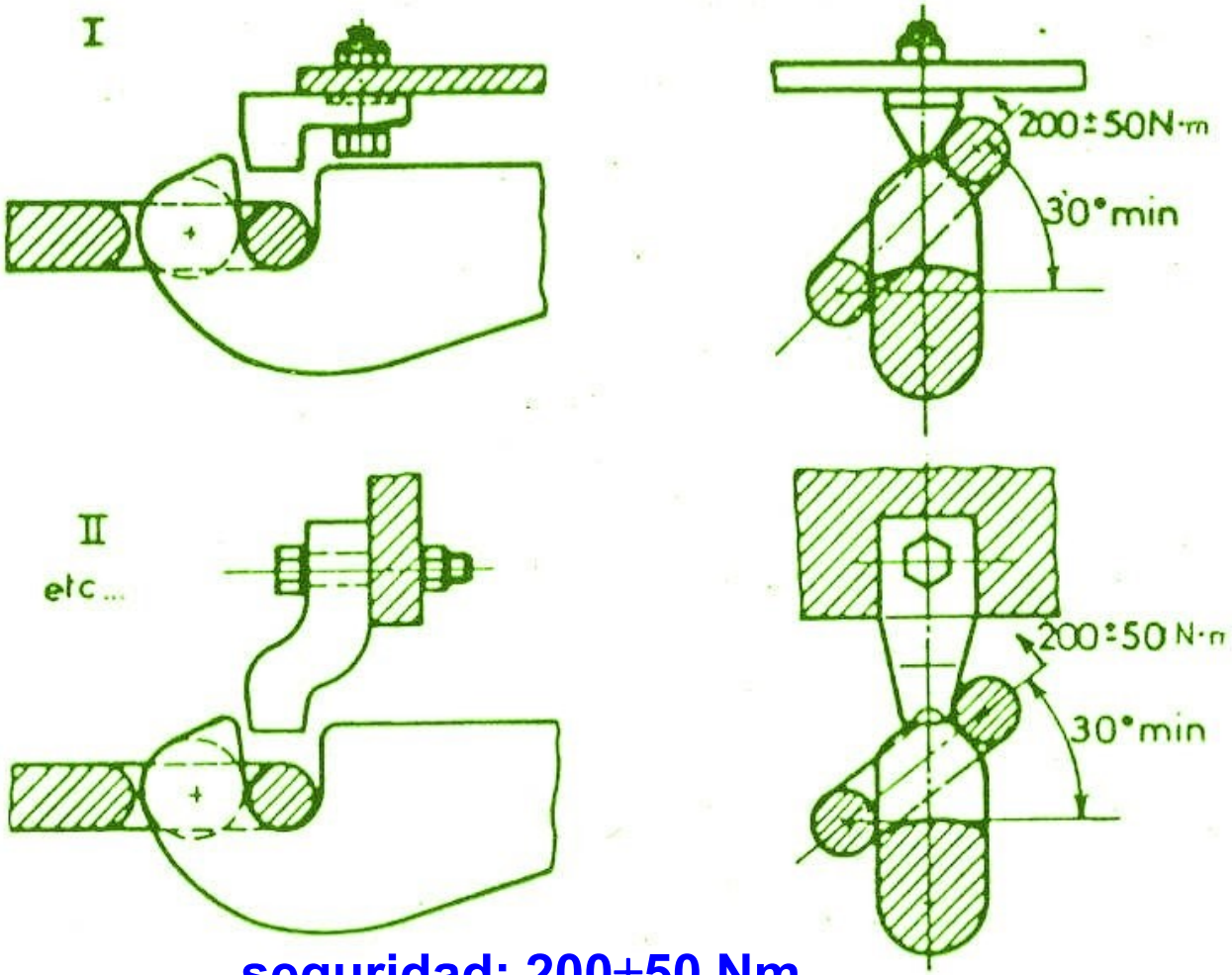
# Compatibilidad de acoplamiento
## (UNE 68031)




**seguridad: 200±50 Nm**

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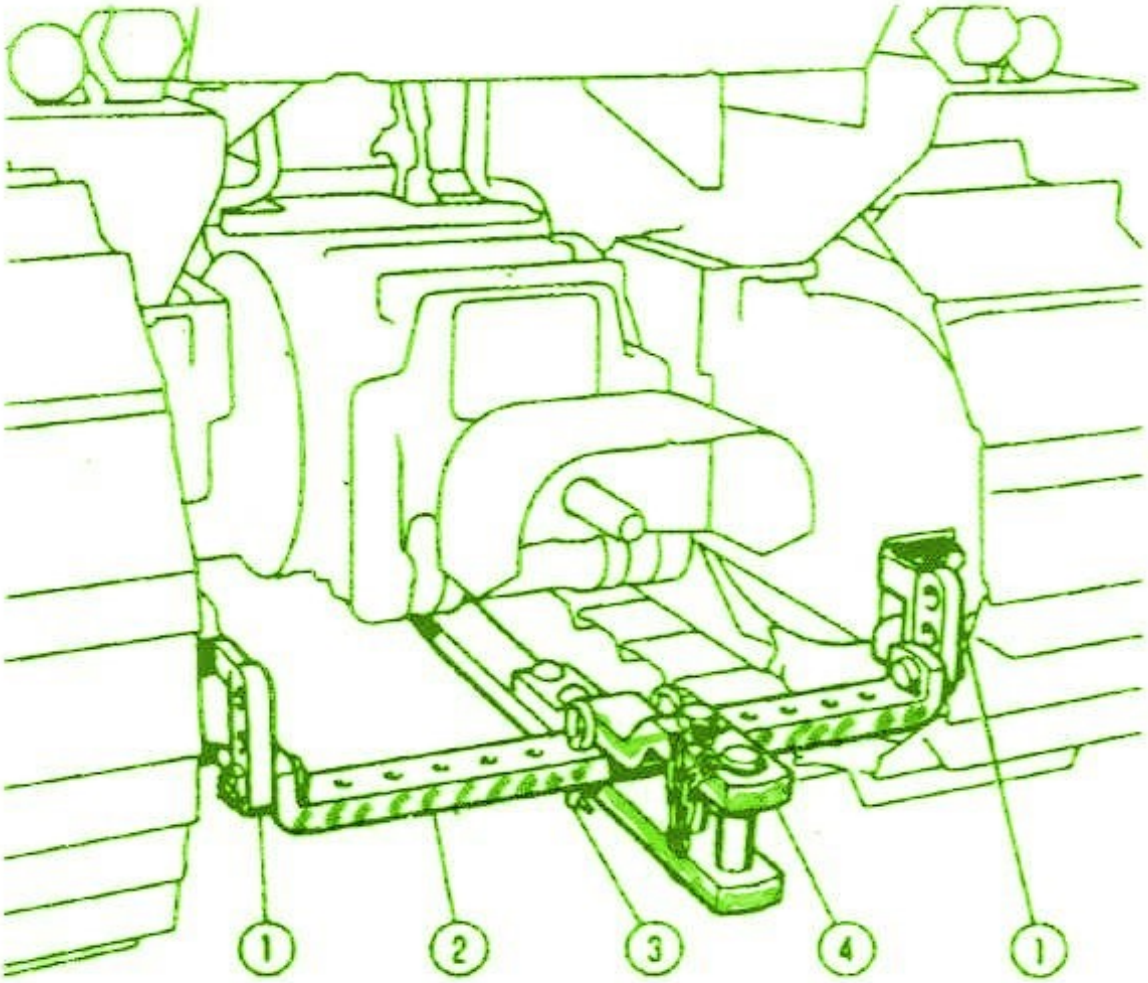
# Barra de tiro oscilante




Aperos y máquinas arrastradas (campo)

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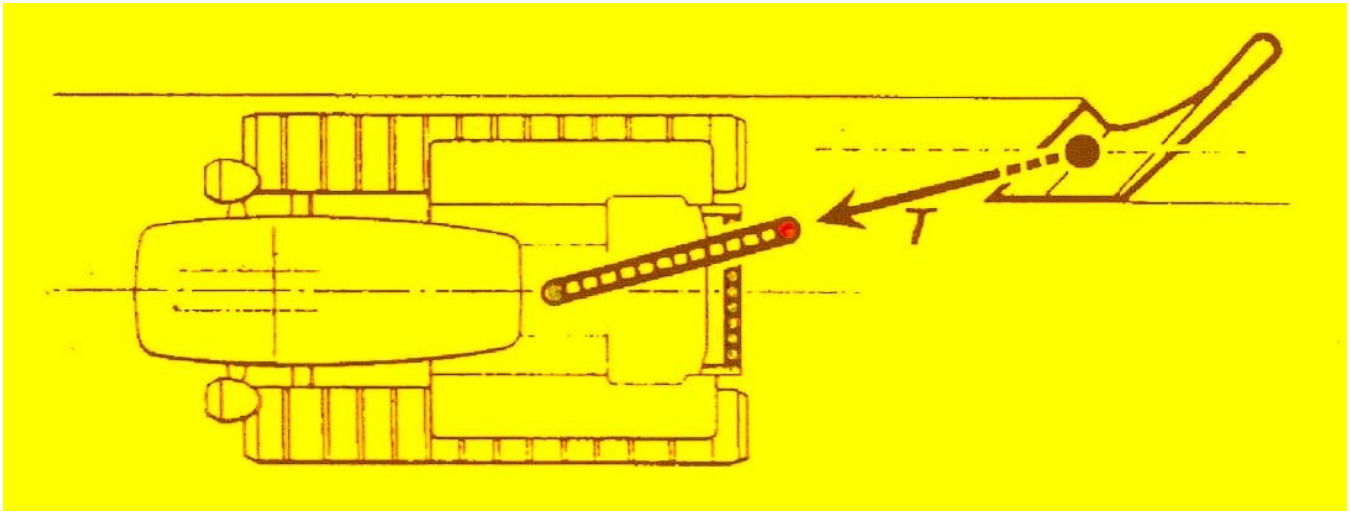
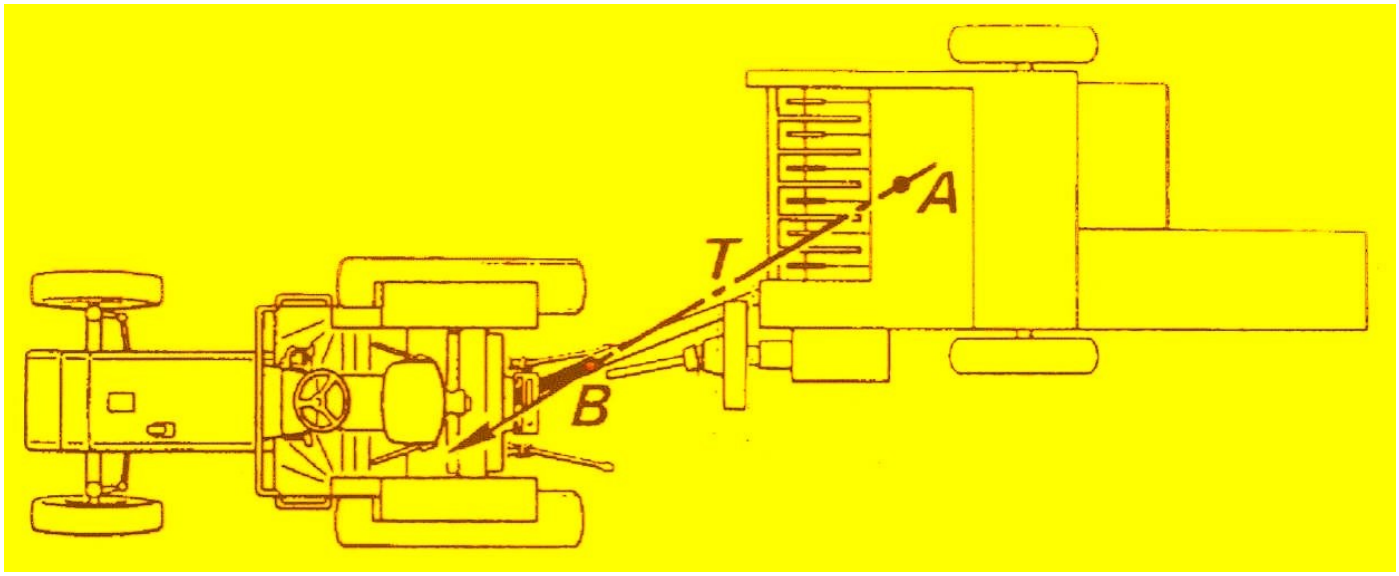
# Aplicación de la barra de tiro

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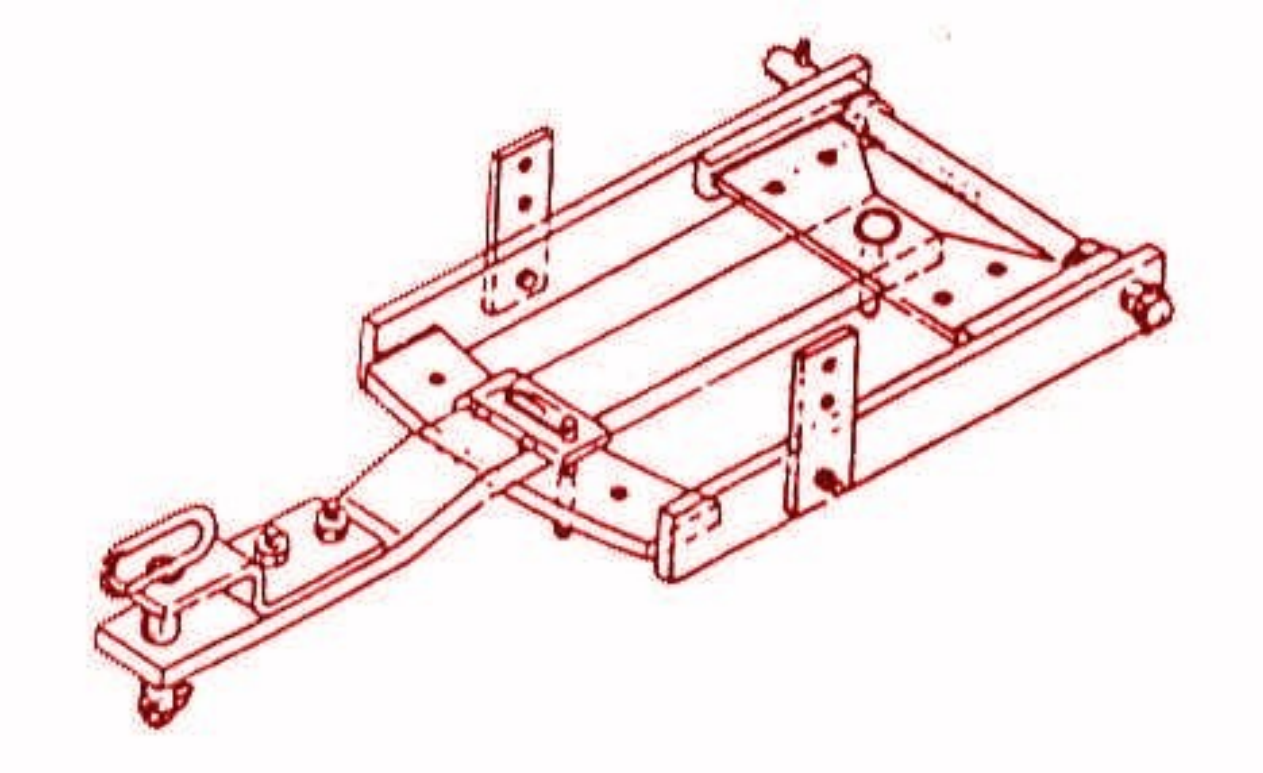
# Enganches mecánicos
## (UNE 68067 – Terminología)

***Para máquinas trabajando en campo***



**barra de tiro oscilante**

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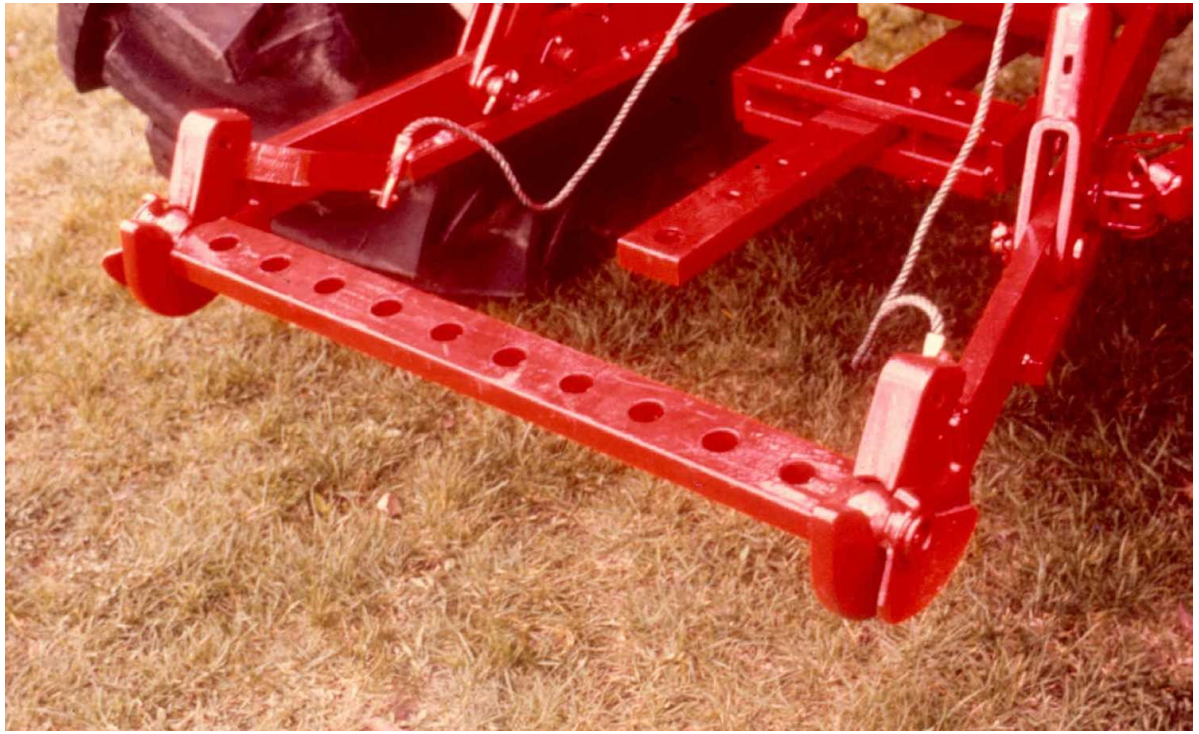
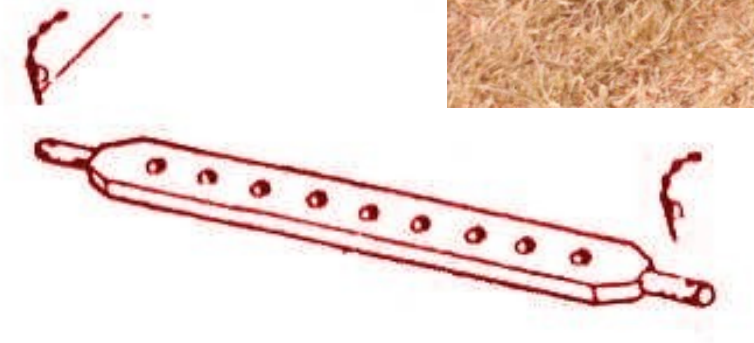
# Enganches mecánicos
## (UNE 68067 – Terminología)

***Para máquinas trabajando en campo***





**barra taladrada**

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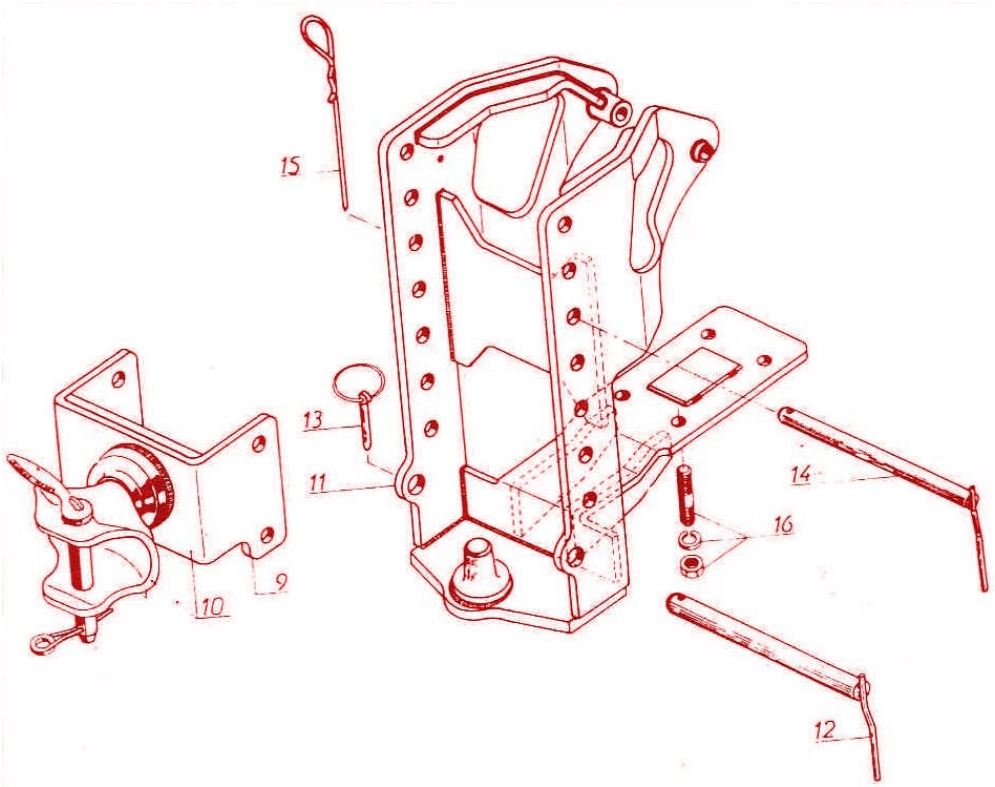
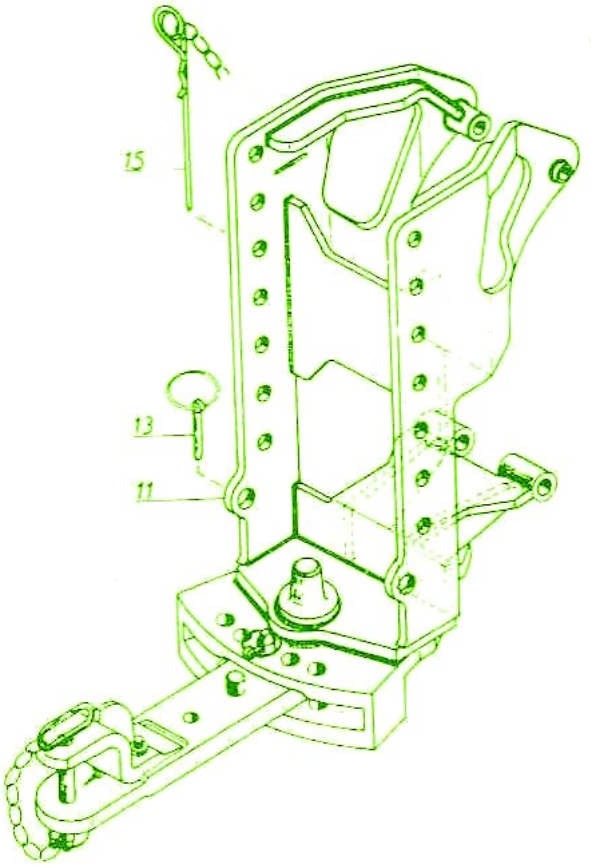
# Adaptación modular para diferentes enganches

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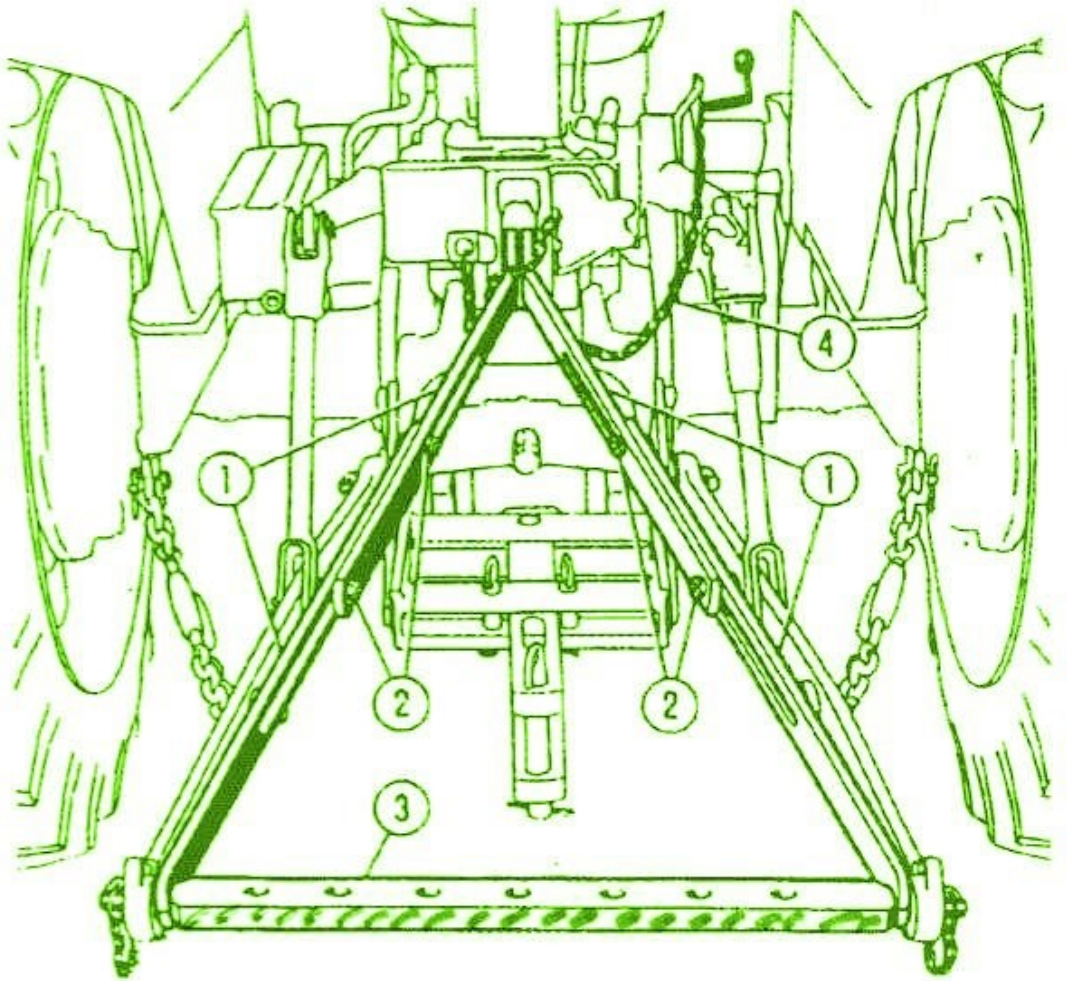
# Transformación del enganche tripuntal (barra taladrada)

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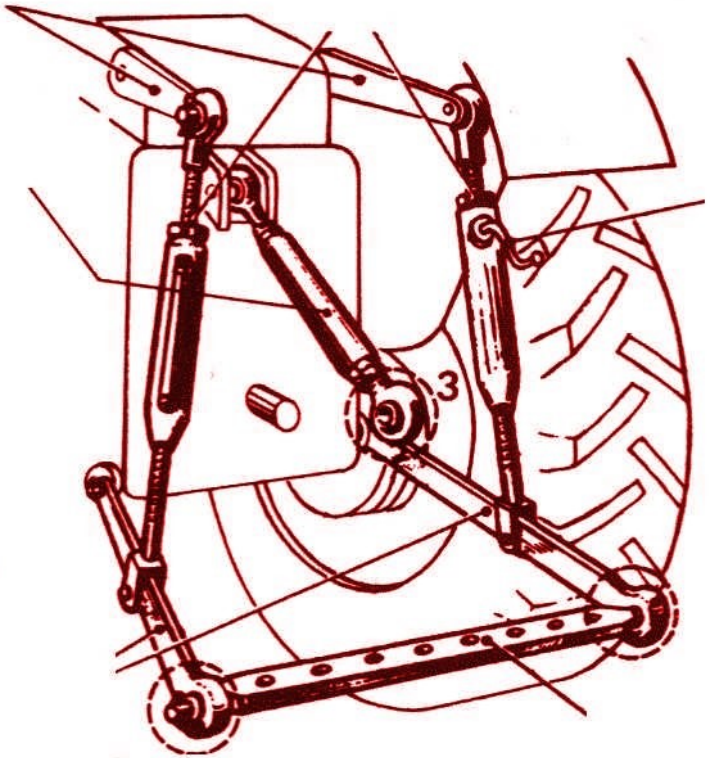
# Enganche en tres puntos




**Máquina integrada en el tractor**

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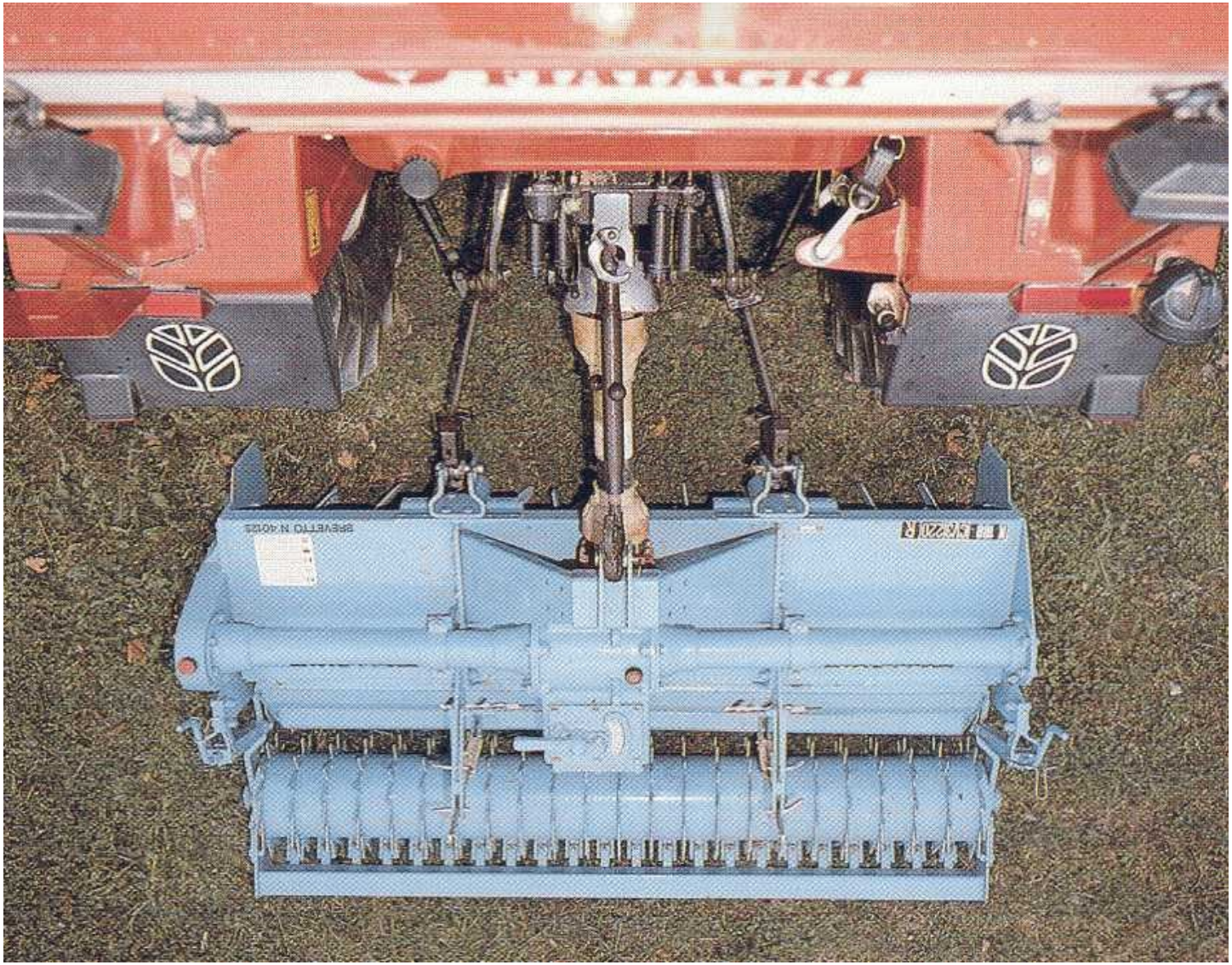
# Normalización de posición y dimensiones



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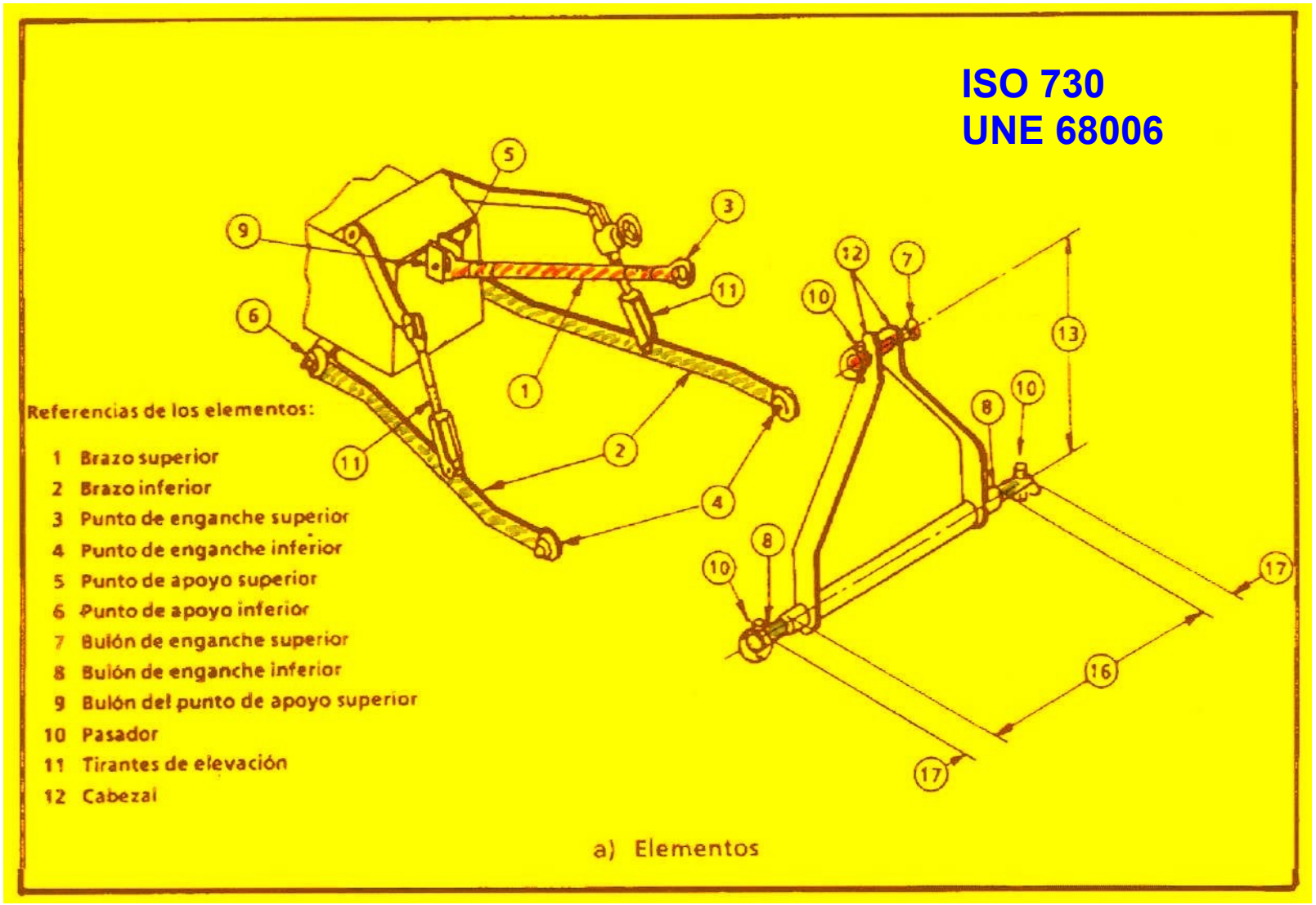
# Enganche en tres puntos

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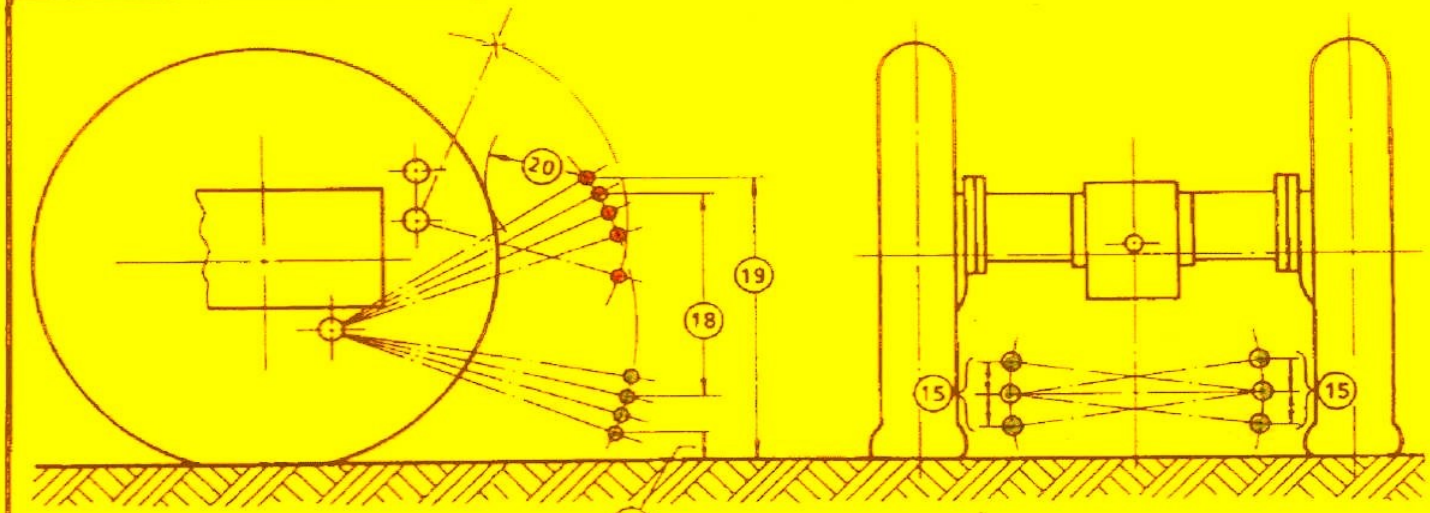
# Enganche en tres puntos




Referencias de las medidas:

13 Altura del cabezal
14 Altura de los puntos de enganche inferiores
15 Campo de regulación transversal
16 Separación entre los puntos de enganche inferiores
17 Distancia del agujero del pasador
18 Carrera de levantamiento
19 Altura de transporte
20 Separación de un punto de enganche inferior

| Categoría | 1 | 2 | 3 |
|---|---|---|---|
| 13 | 460 ± 1.5 | 610 ± 1.5 | 685 ± 1.5 |
| 14 | máx. 200 | máx. 200 | máx. 230 |
| 15 | 100 | 100 | 125 |
| 16 | 683 ± 1.5 | 825 ± 1.5 | 965 ± 1.5 |
| 17 | mín. 39 | mín. 49 | mín. 52 |
| 18 | mín 560 | mín. 650 | mín. 739 |
| 19 | mín. 820 | mín. 950 | mín 1065 |
| 20 | mín. 100 | mín. 100 | mín. 100 |

b) Medidas (en mm)

**Potencia barra: tipo 1: <35 kW; tipo 2: 30-75 kW; tipo 3: > 70 kW**

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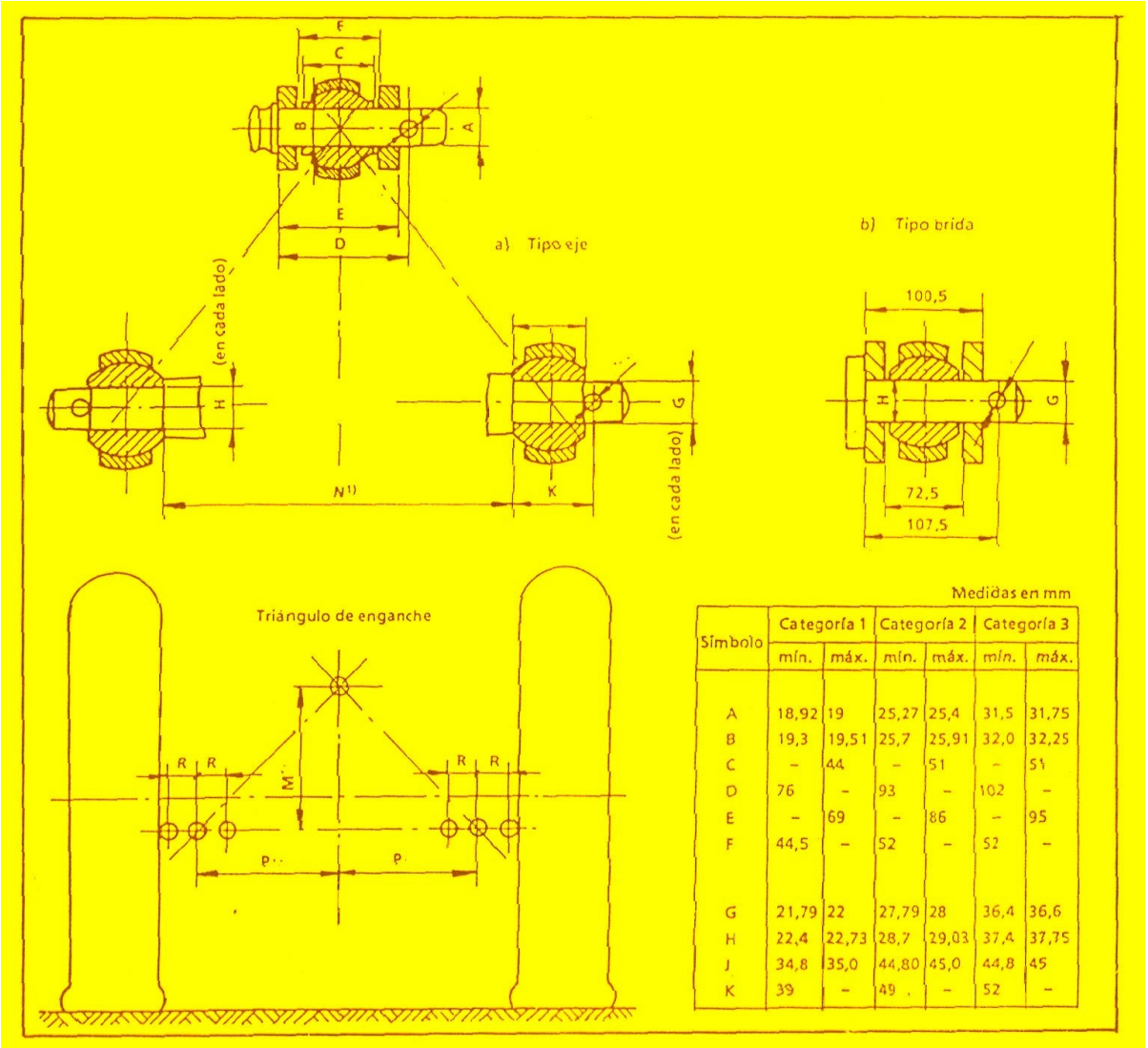
# Enganche en tres puntos




| Símbolo | Categoría 1 | | Categoría 2 | | Categoría 3 | |
|---|---|---|---|---|---|---|
| | mín. | máx. | mín. | máx. | mín. | máx. |
| A | 18,92 | 19 | 25,27 | 25,4 | 31,5 | 31,75 |
| B | 19,3 | 19,51 | 25,7 | 25,91 | 32,0 | 32,25 |
| C | – | 44 | – | 51 | – | 51 |
| D | 76 | – | 93 | – | 102 | – |
| E | – | 69 | – | 86 | – | 95 |
| F | 44,5 | – | 52 | – | 52 | – |
| G | 21,79 | 22 | 27,79 | 28 | 36,4 | 36,6 |
| H | 22,4 | 22,73 | 28,7 | 29,03 | 37,4 | 37,75 |
| J | 34,8 | 35,0 | 44,80 | 45,0 | 44,8 | 45 |
| K | 39 | – | 49 | – | 52 | – |

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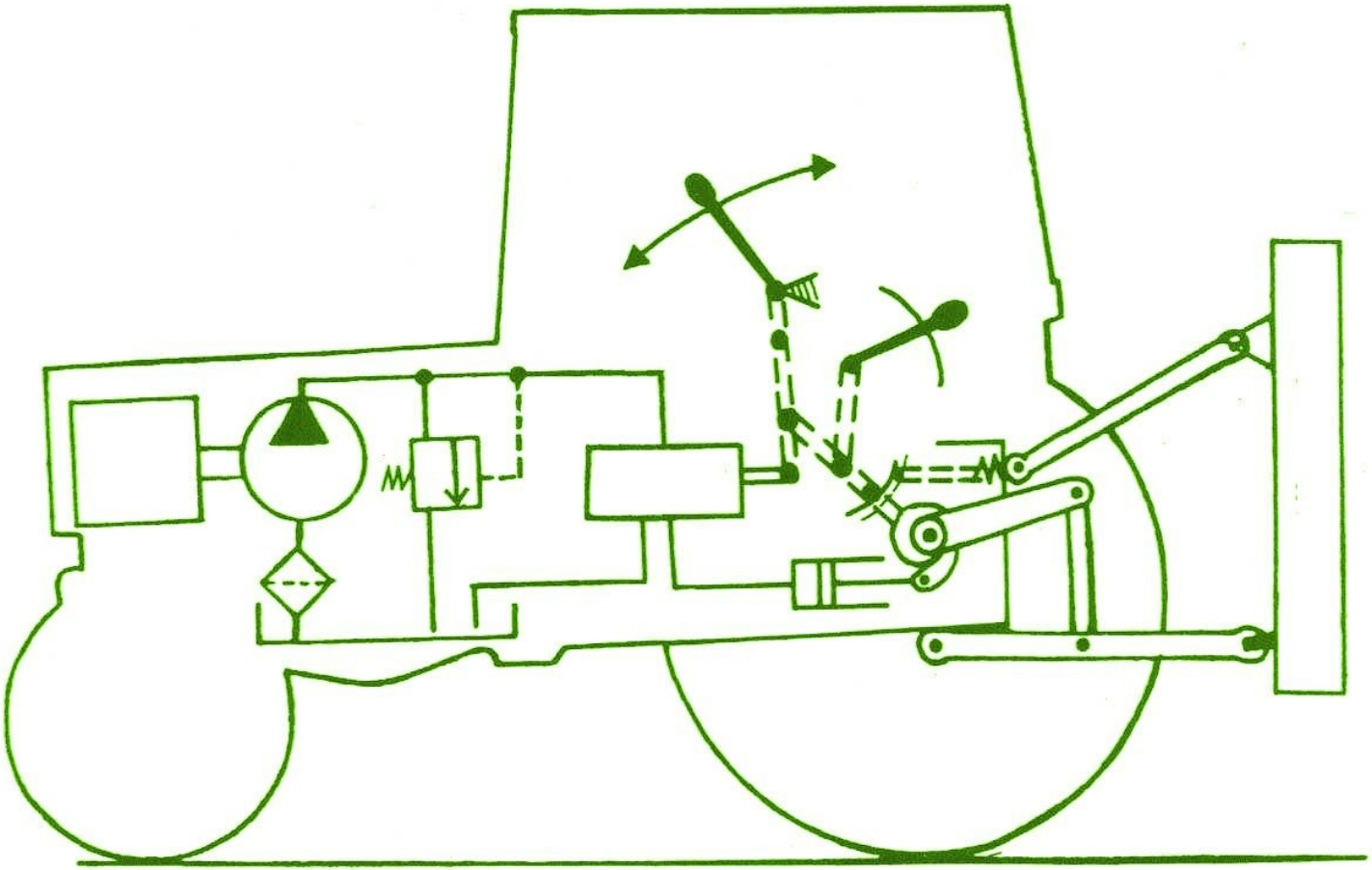
# Control del enganche en tres puntos



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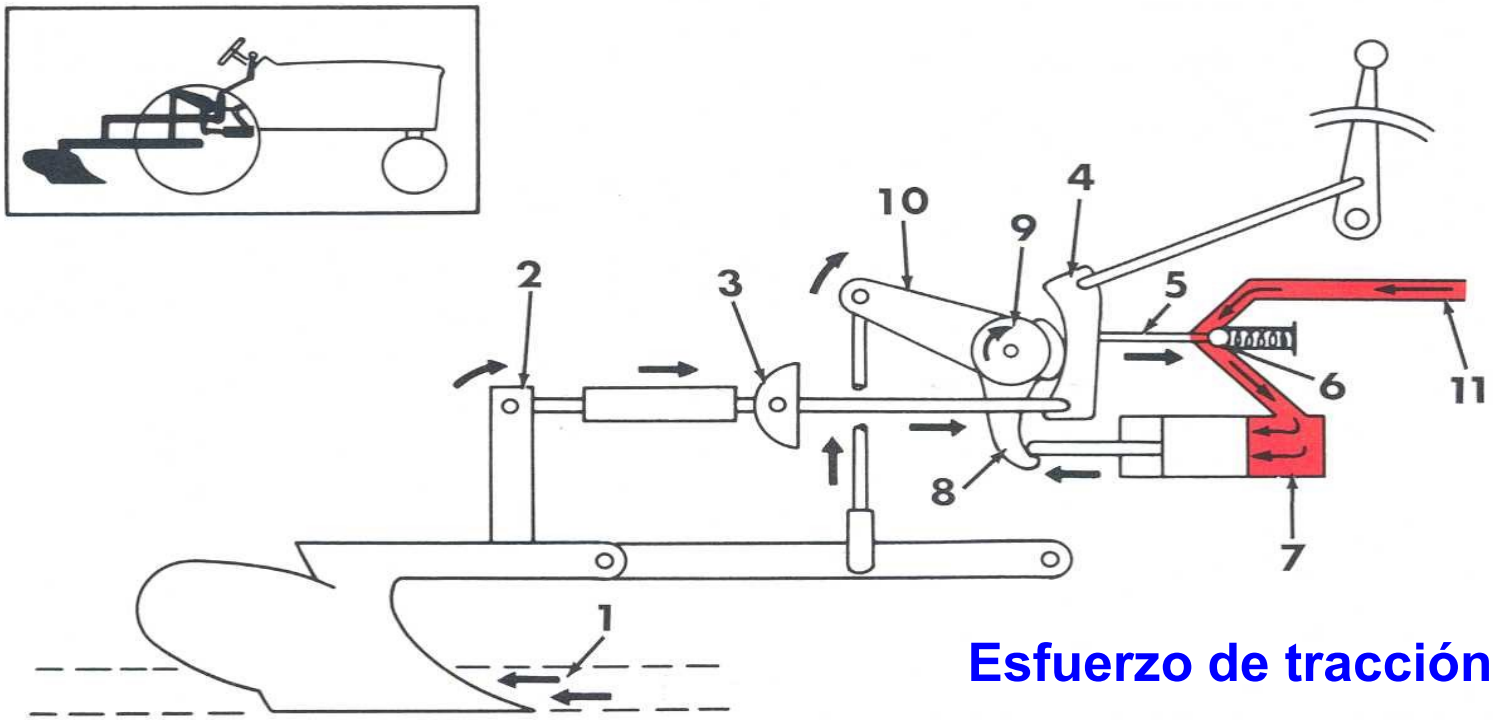
# Control del enganche en tres puntos




**Esfuerzo de tracción**

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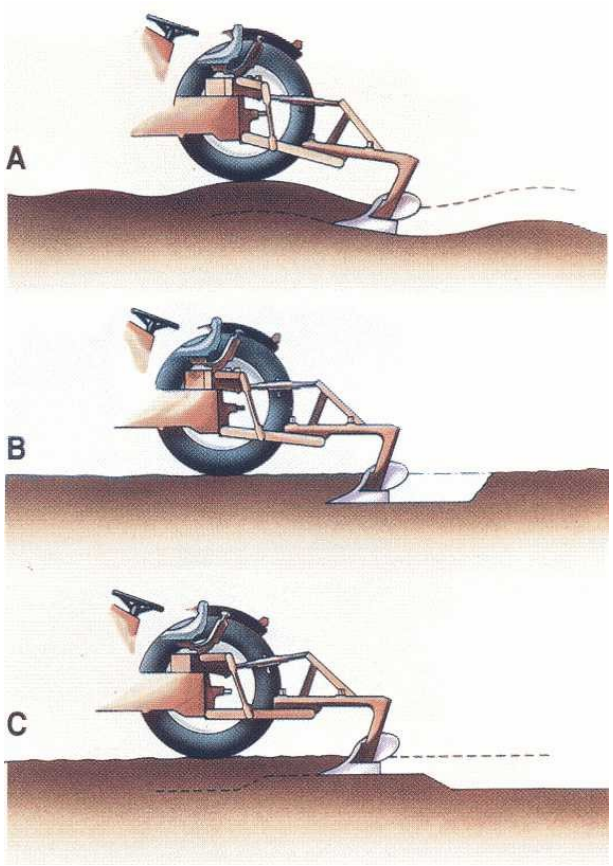
# Control de tracción (carga)

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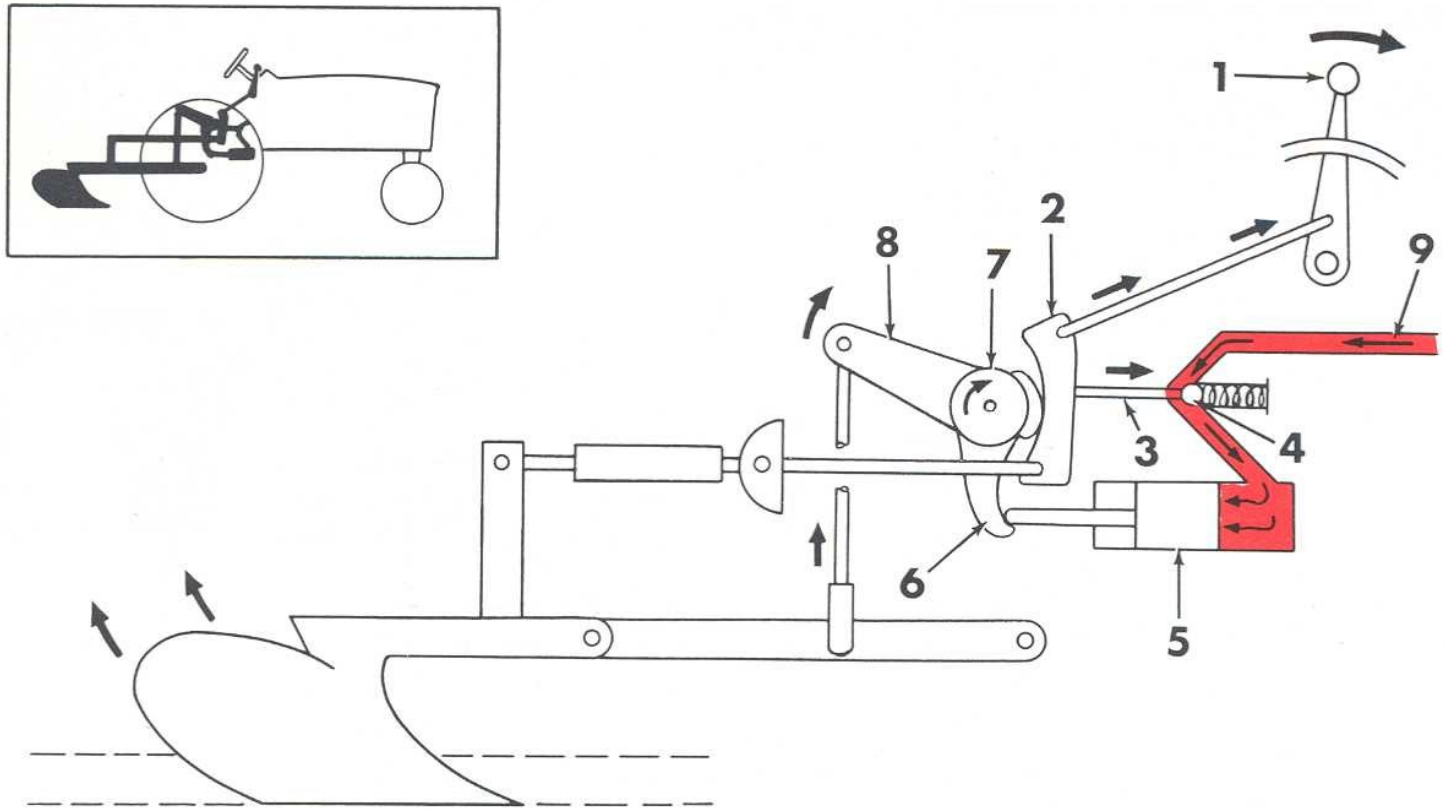
# Control del enganche en tres puntos

Posición

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# Posición flotante y fija

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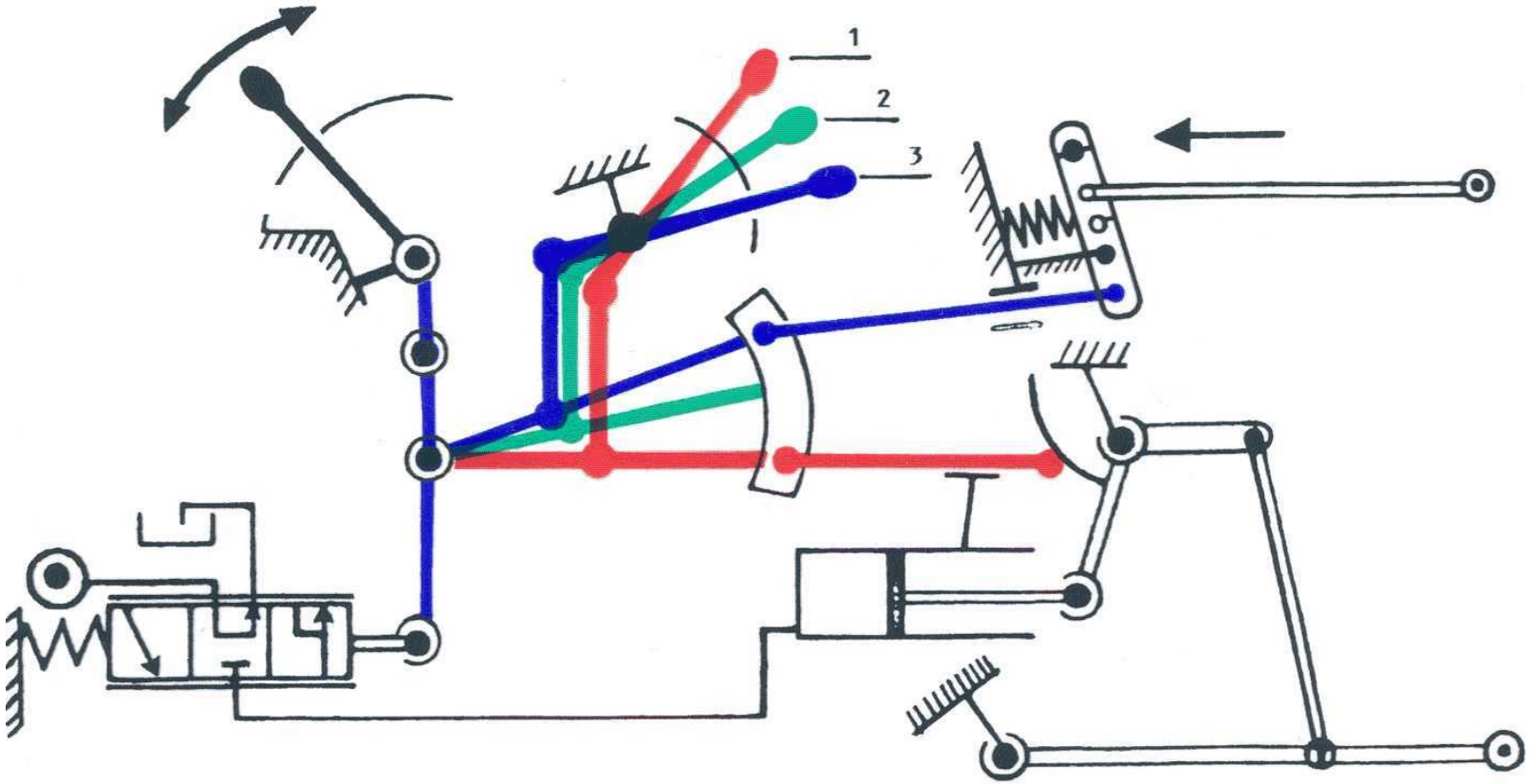
# Control de posición y de carga

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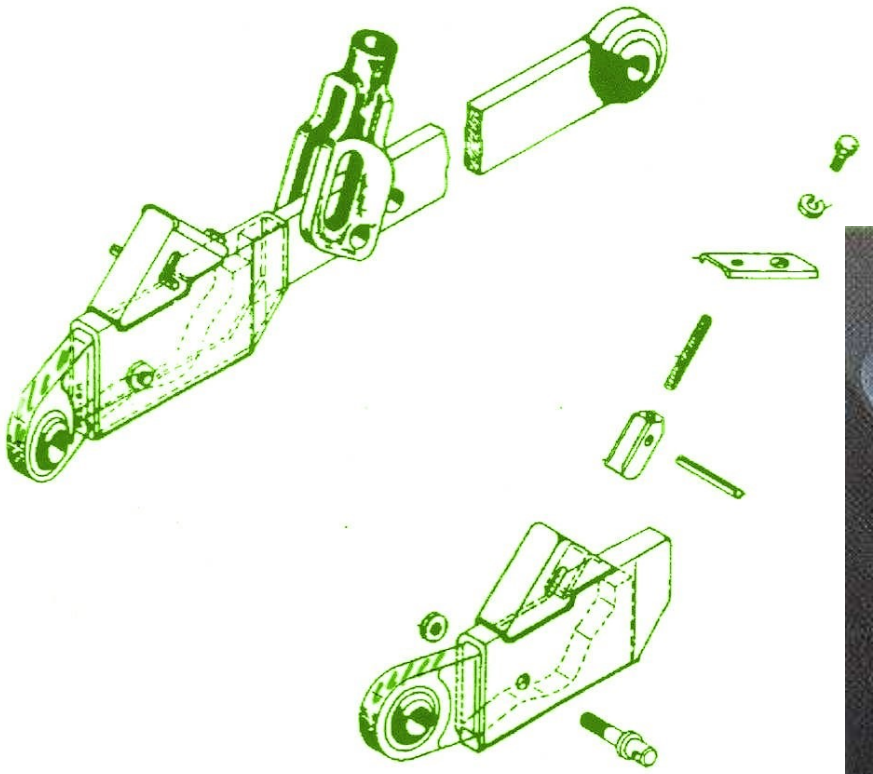
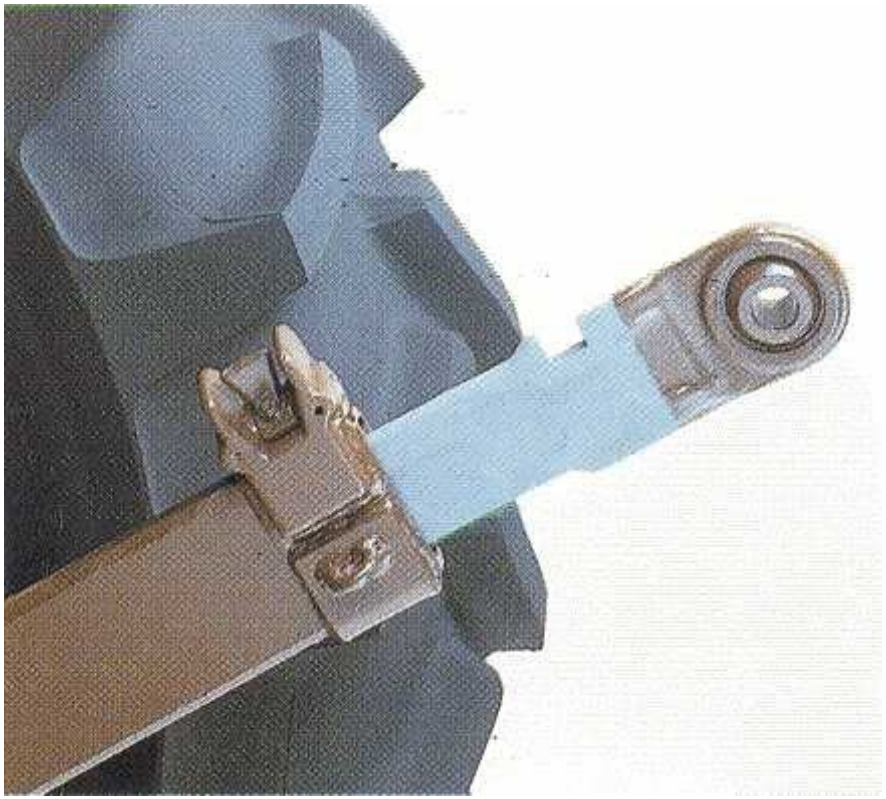
# Brazos inferiores telescópicos





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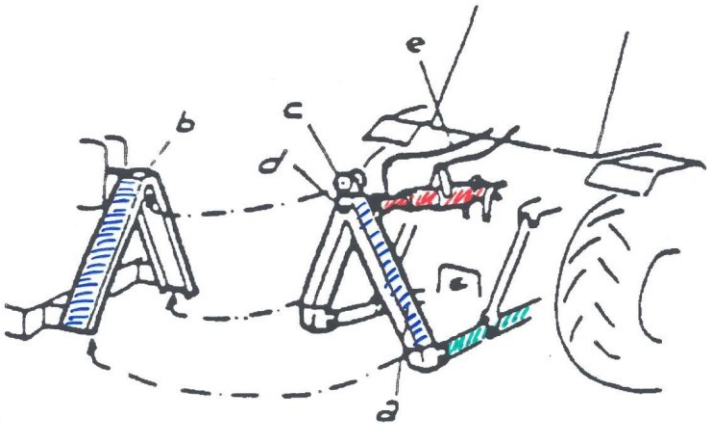
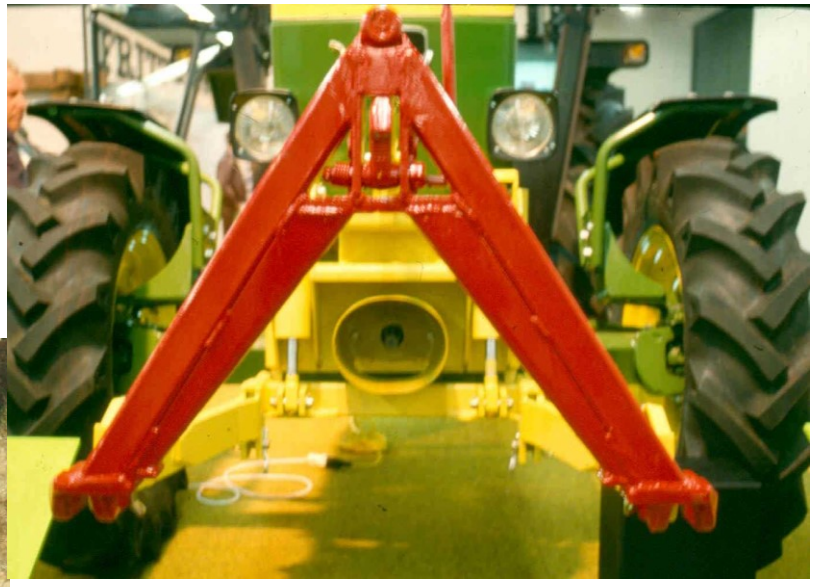
# Enganches automáticos



**Tipo A – Accord**
**ISO 11001-2**

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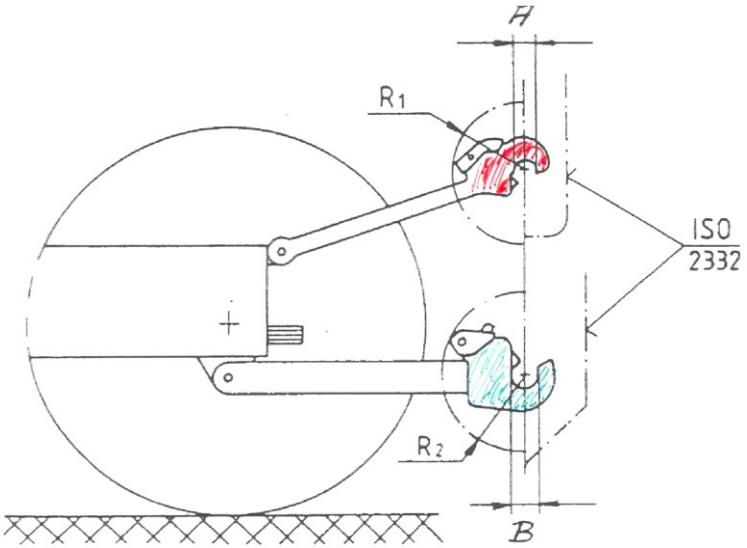
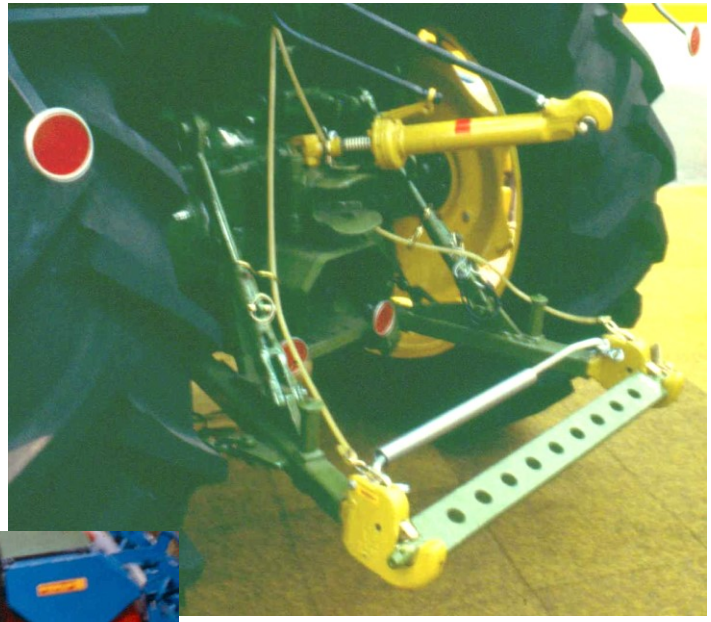
# Enganche automático en dos fases



ISO 11001-3

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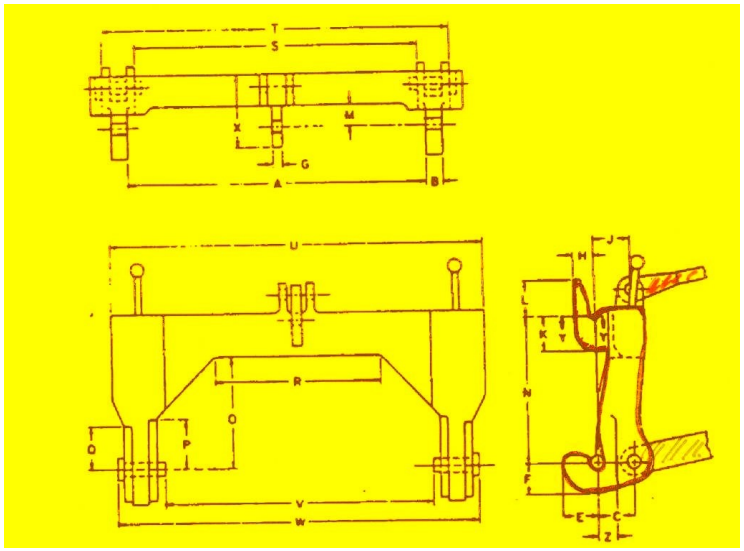
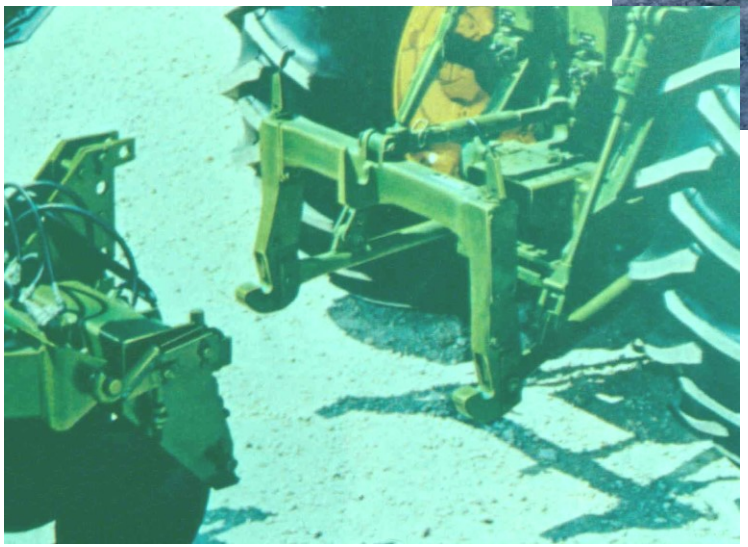
# Enganches automáticos



**Tipo U – Americano**
**ISO 11001-1**

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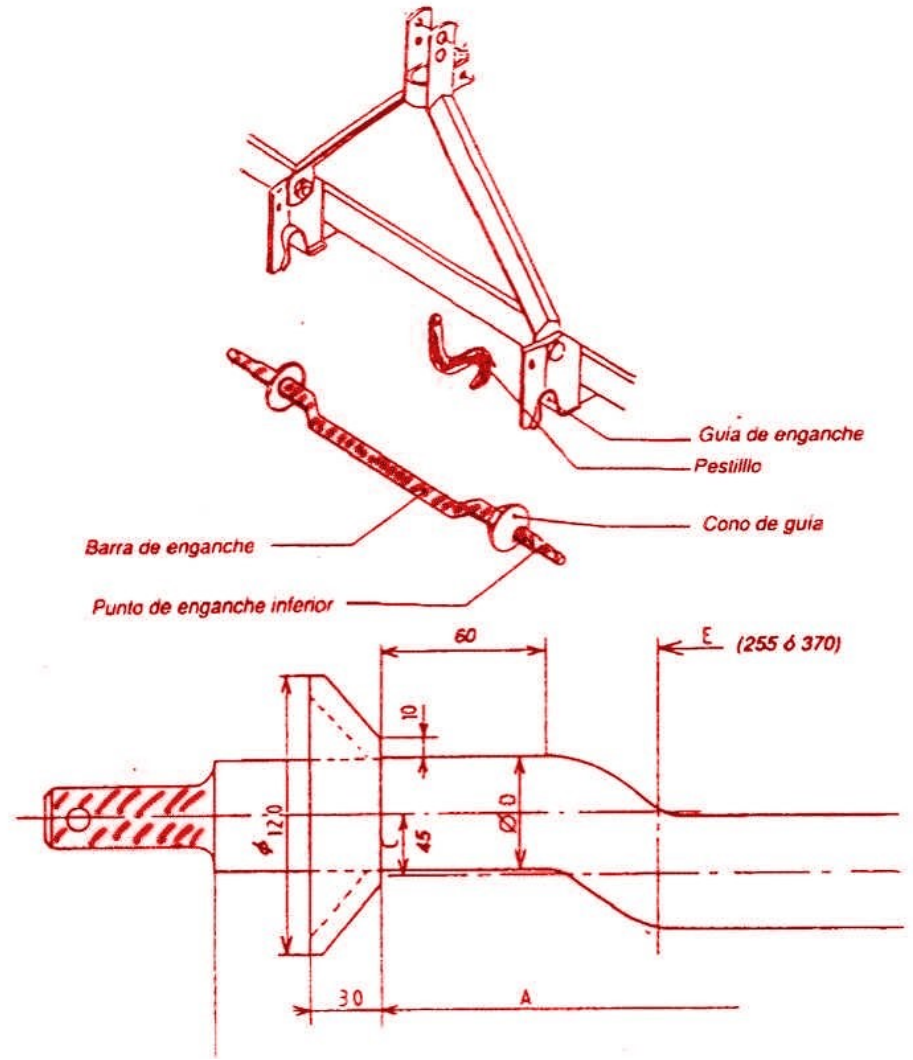
# Enganche automático en dos fases

**Tipo barra**
**ISO 11001/4**

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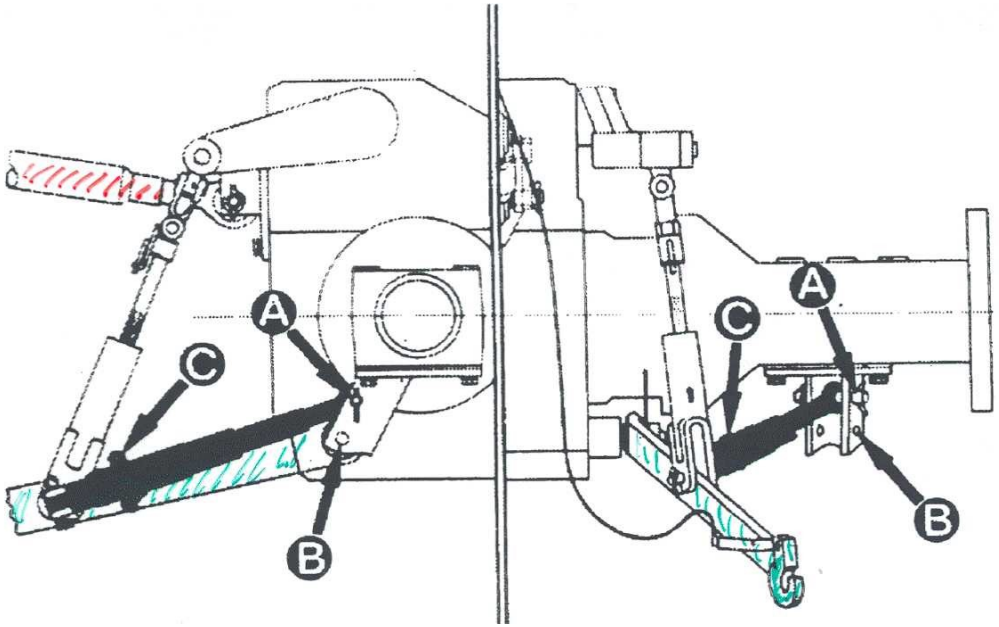
# Tensores de estabilización

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# Utilización de la toma de fuerza

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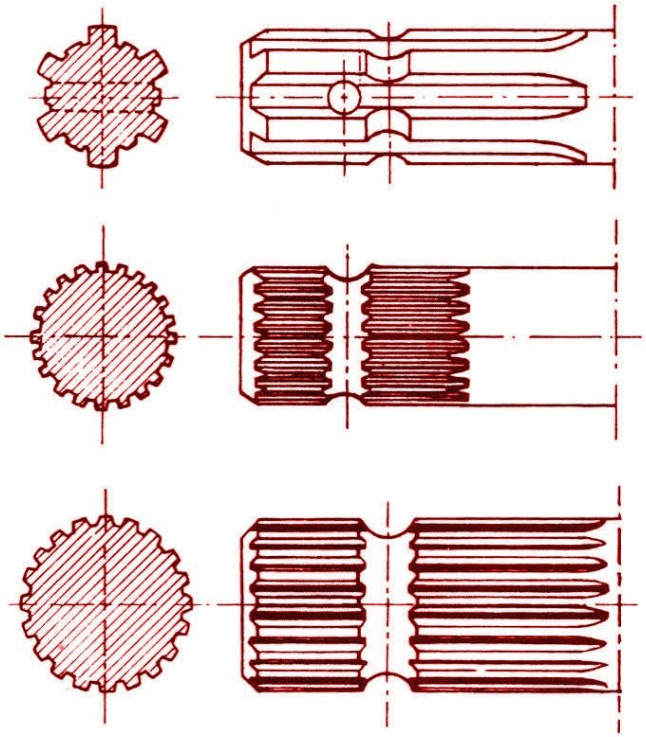
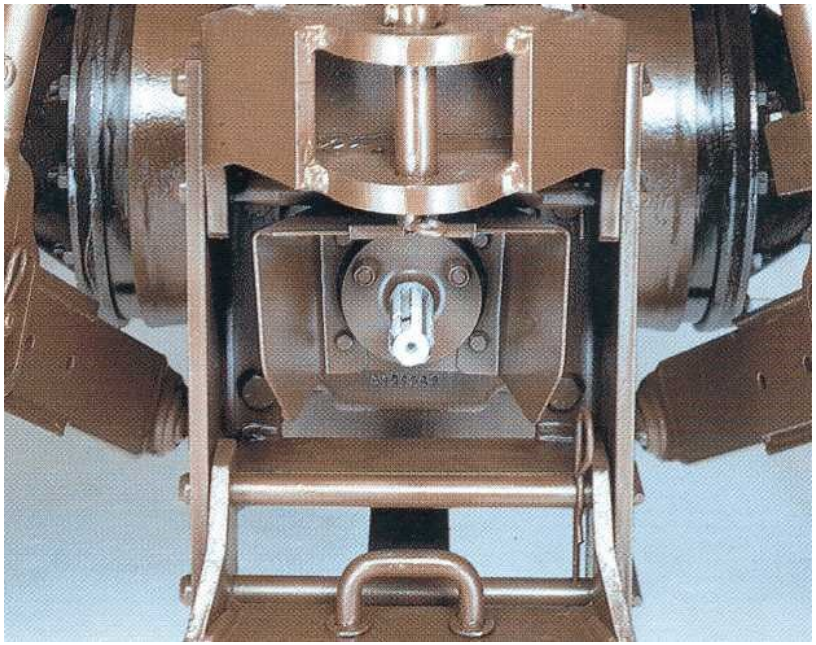
# Tomas de fuerza (potencia)

| Tipo de toma de fuerza | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Diámetro nominal (mm) | 35 | 35 | 45 | 57 |
| Nº de acanaladuras | 6 | 21 | 20 | 18 |
| Régimen nominal (rev/min) | 540 | 1000 | 1000 | 1000 |
| Potencia máxima (kW - CV) | 48 - 65 | 92 - 125 | 185 - 252 | 340 - 462 |



**ISO 500**



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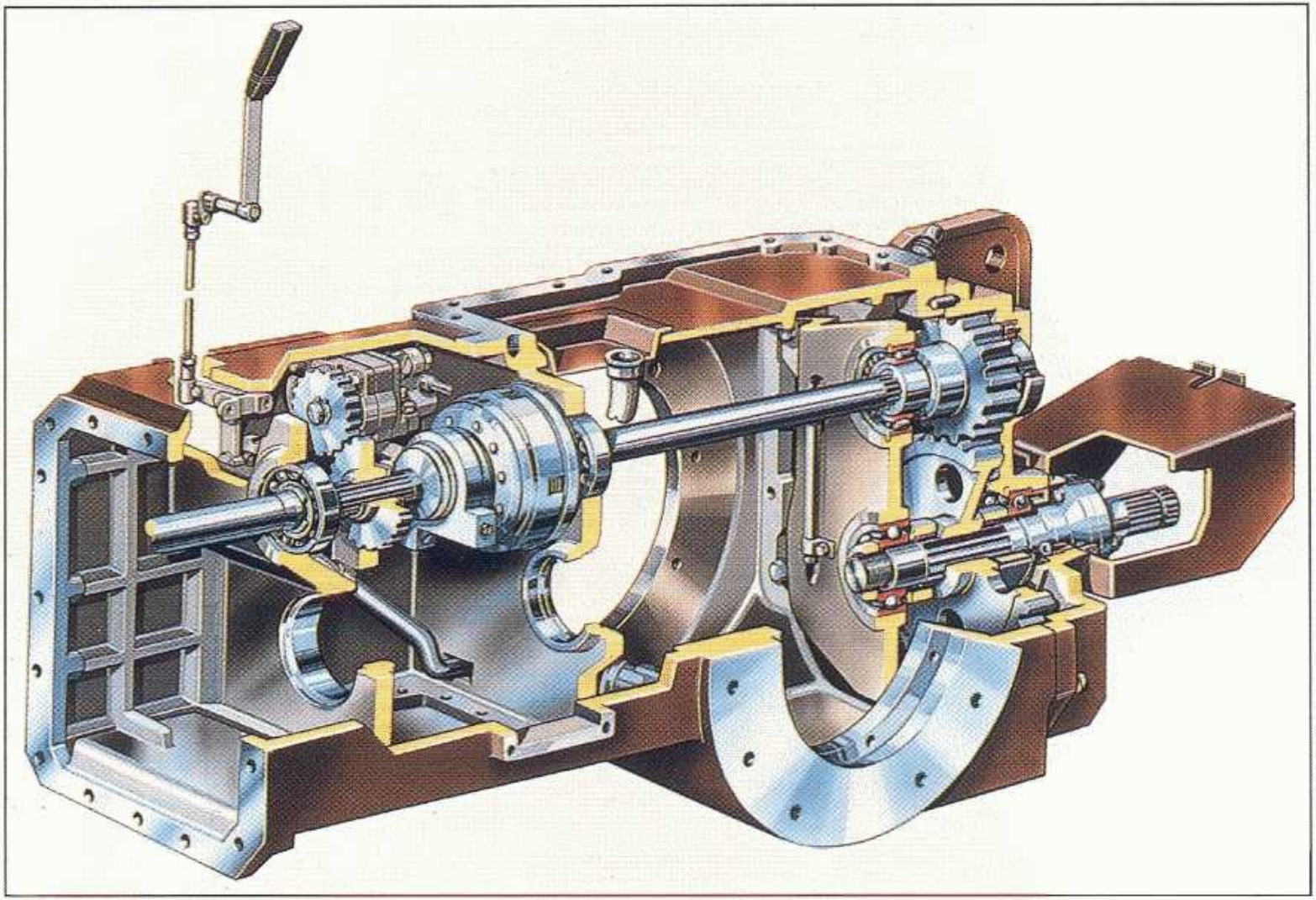
# Transmisión de la toma de fuerza



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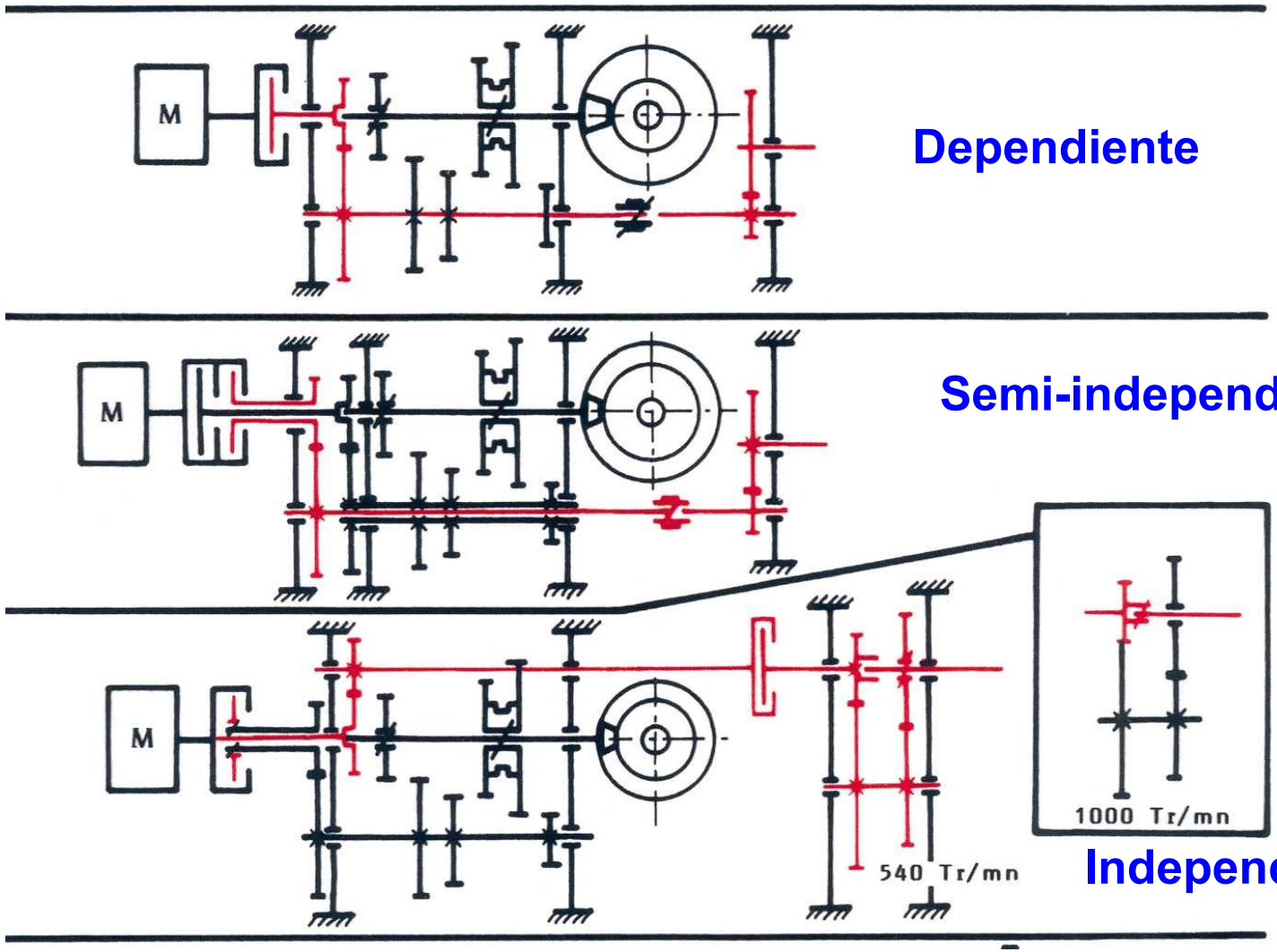
# Transmisión del motor a la toma de fuerza

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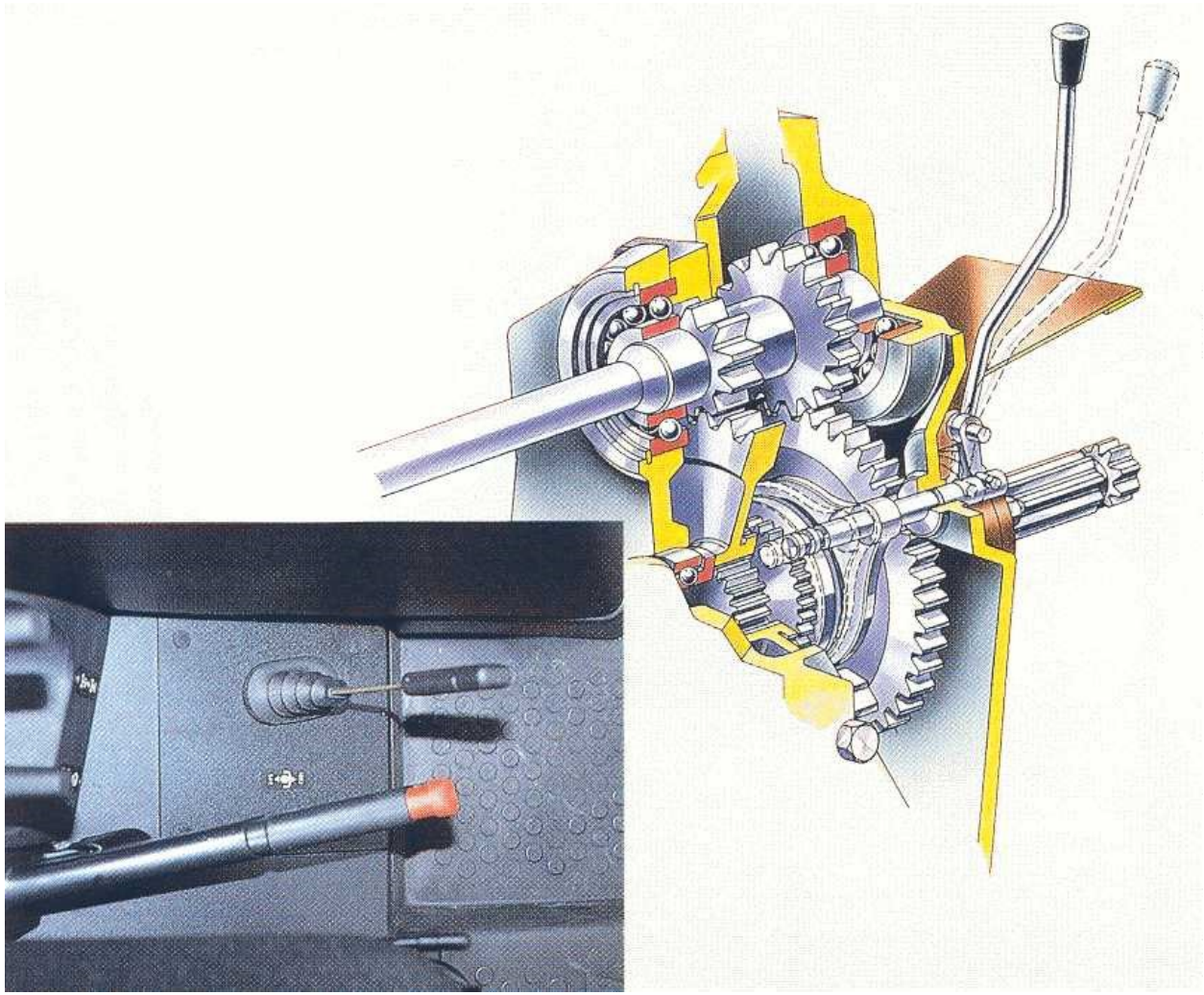
# Cambio de régimen mediante palanca



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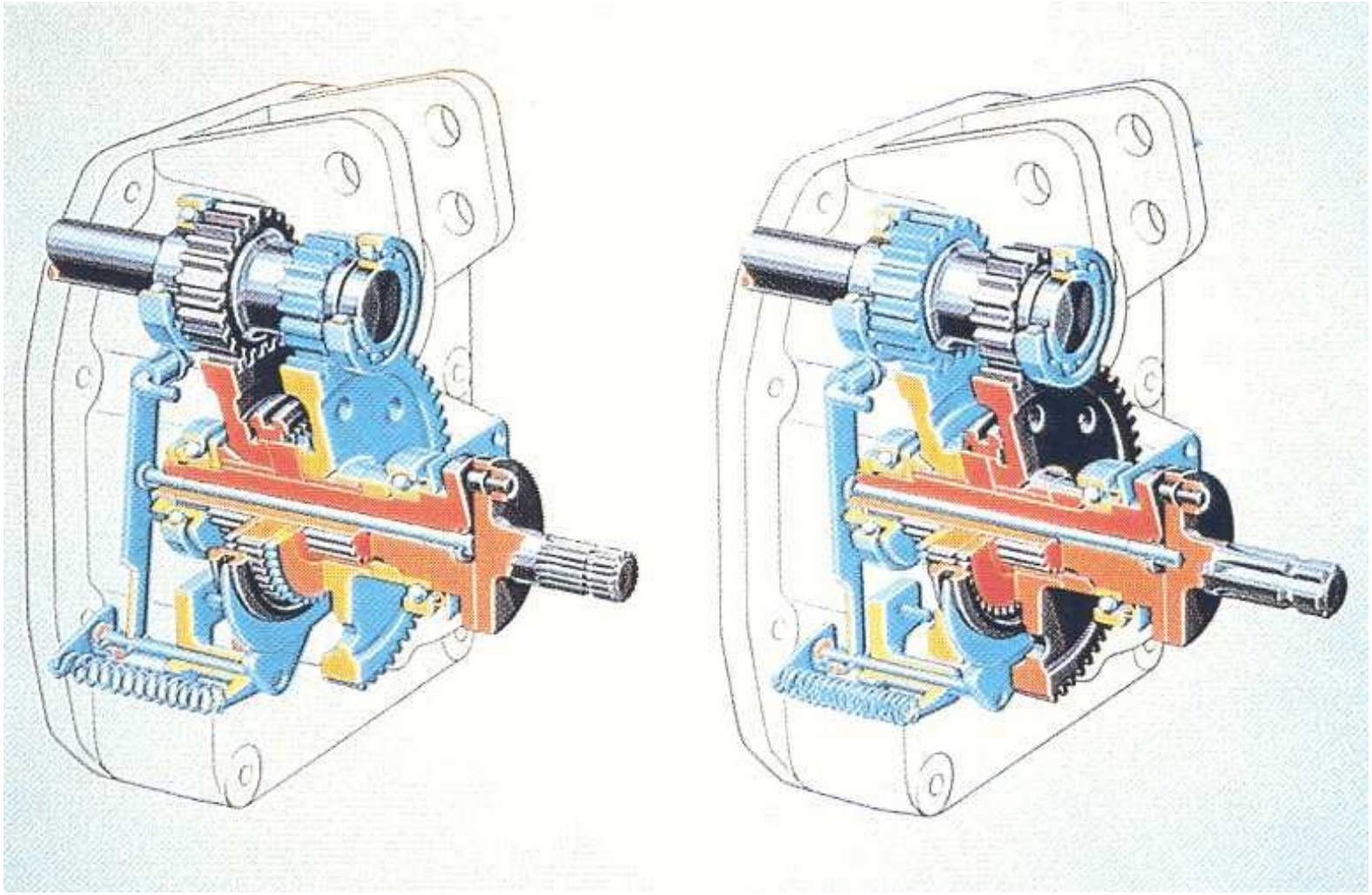
# Cambio de régimen por intercambio del eje



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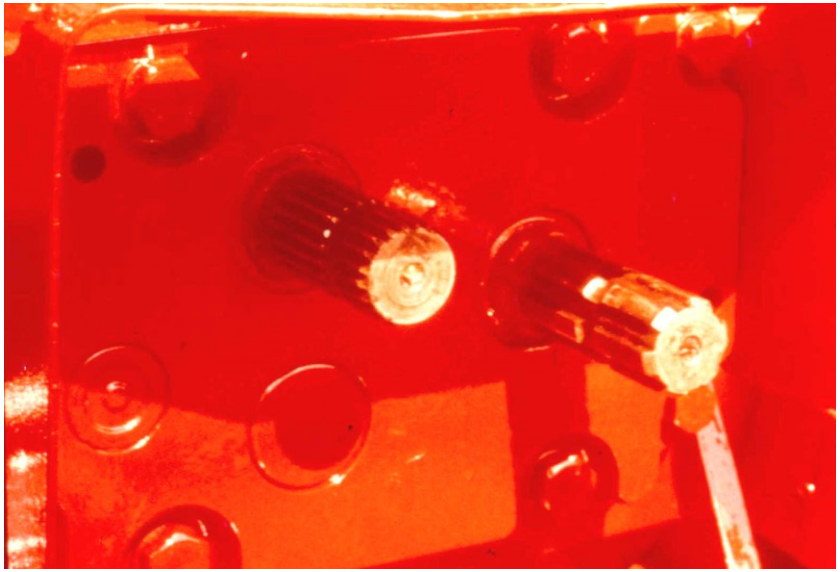
# Toma de fuerza dual



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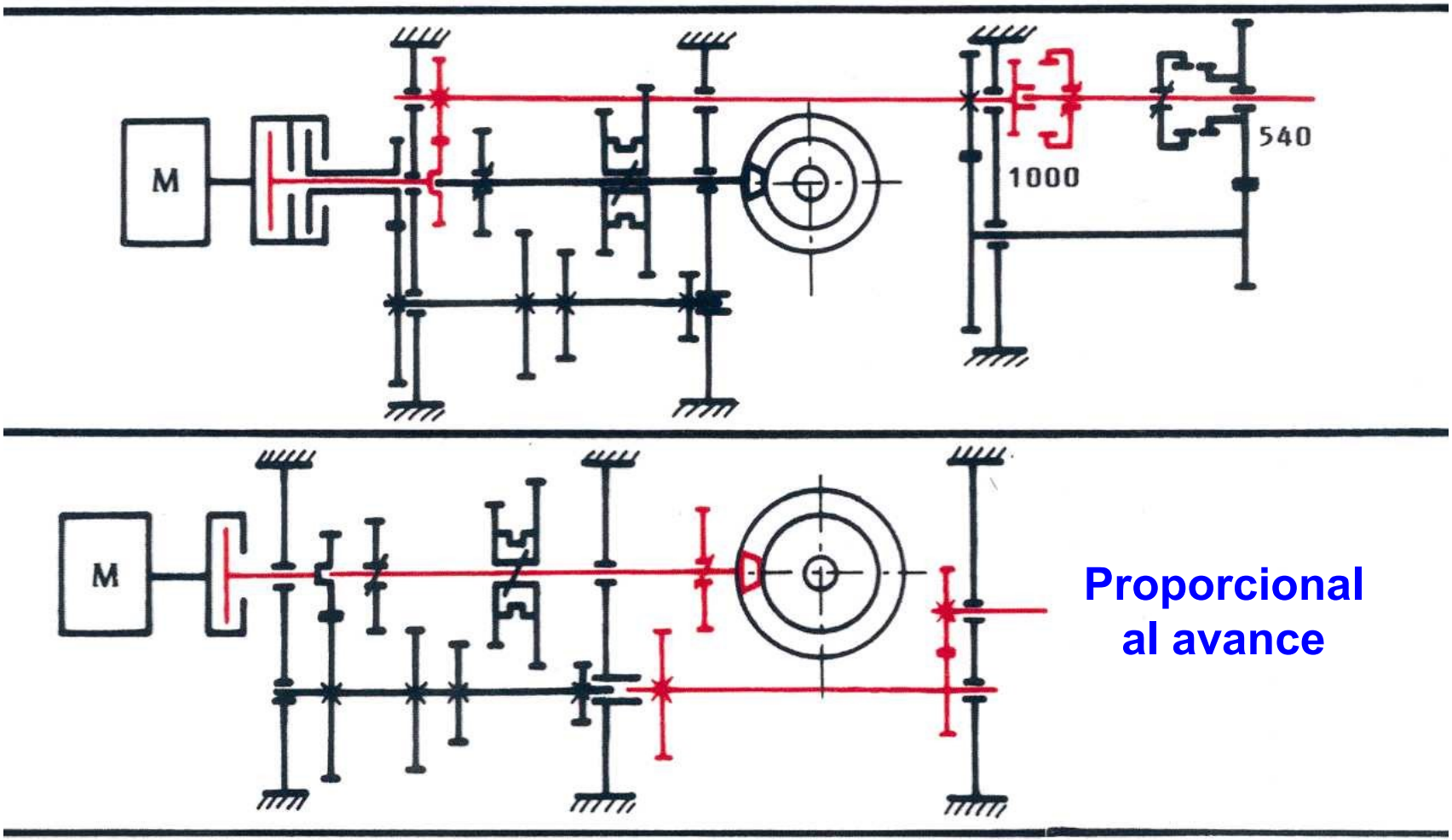
# Transmisión del motor a la toma de fuerza




**Proporcional al avance**

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# Remolque con ruedas motrices (toma de fuerza proporcional)

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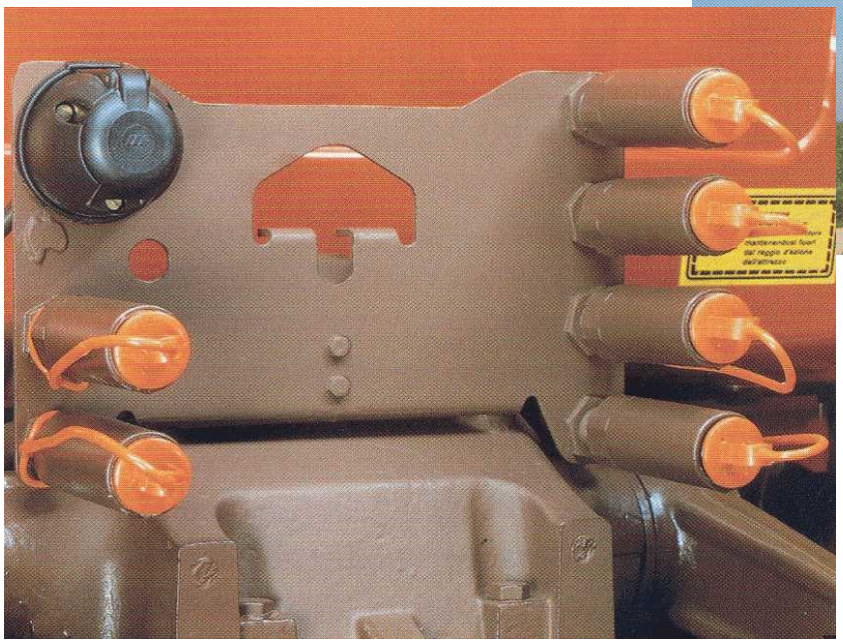
# Tomas hidráulicas para servicios externos

**ISO 5675**

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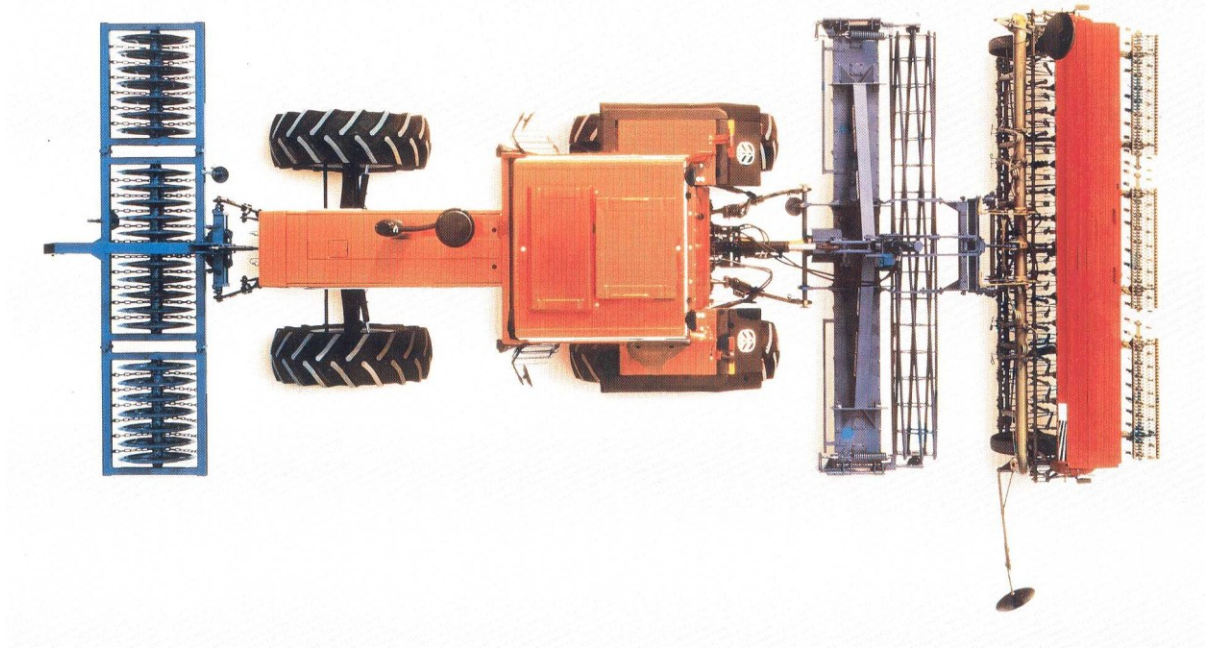
# Enganche frontal y posterior



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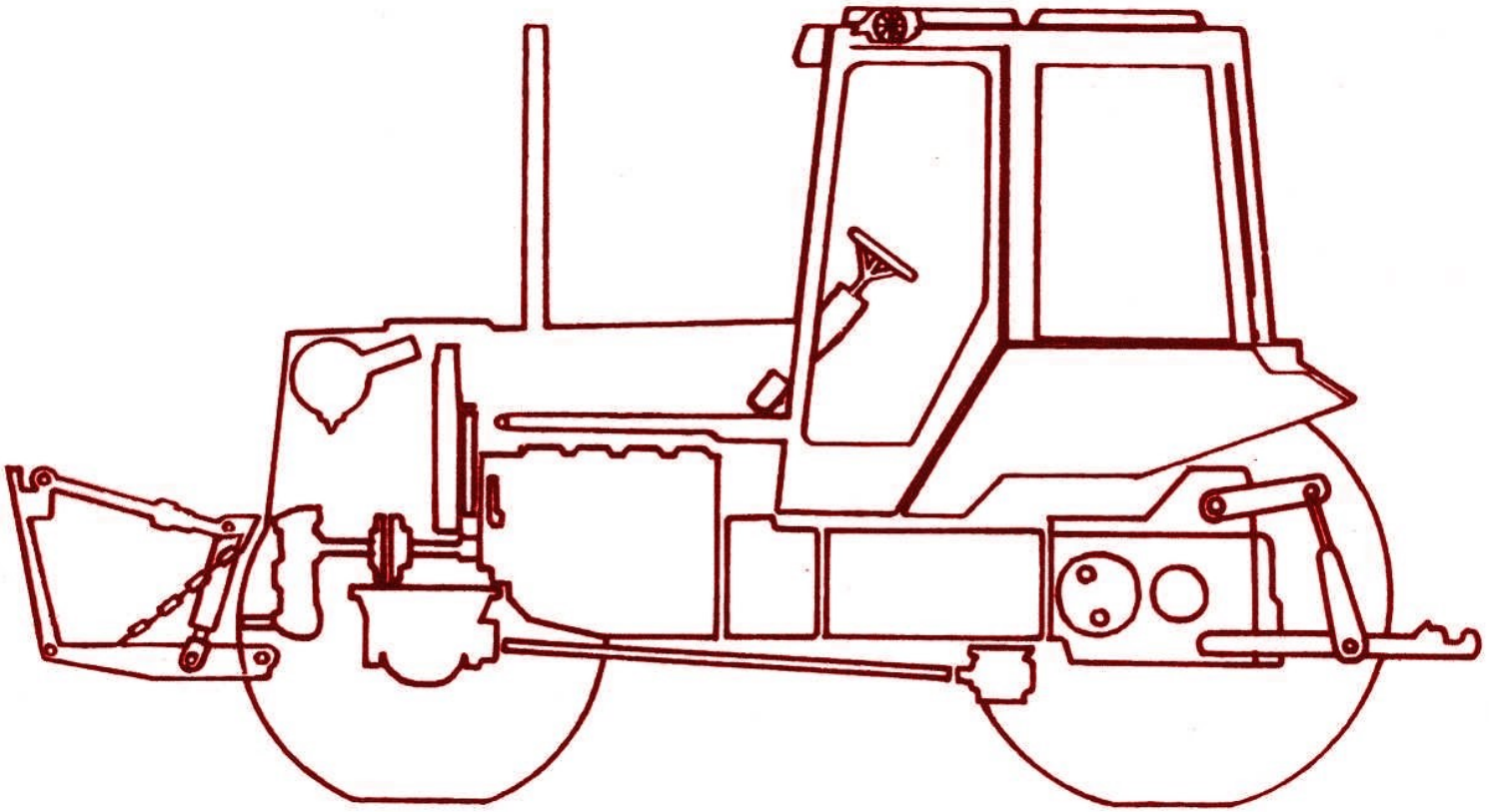
# Enganche y toma de fuerza frontal



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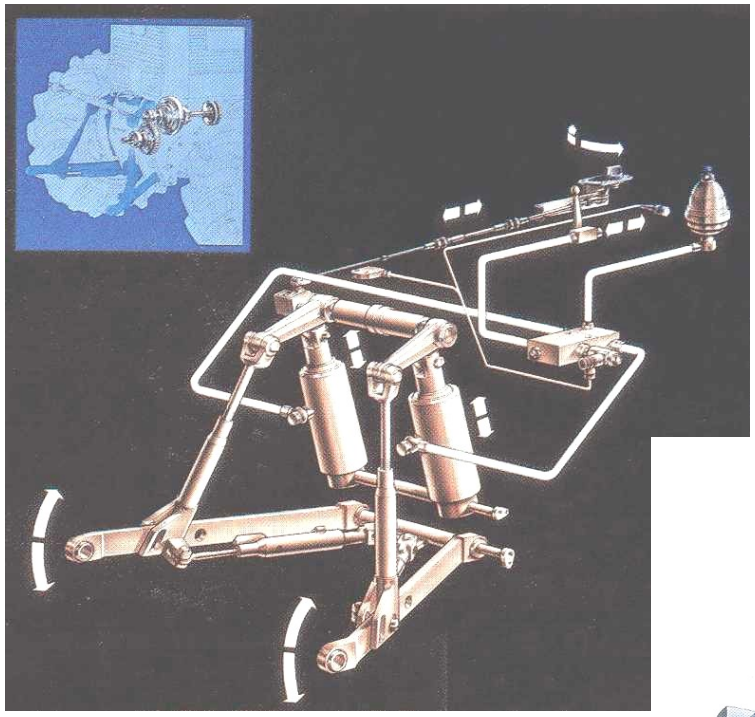
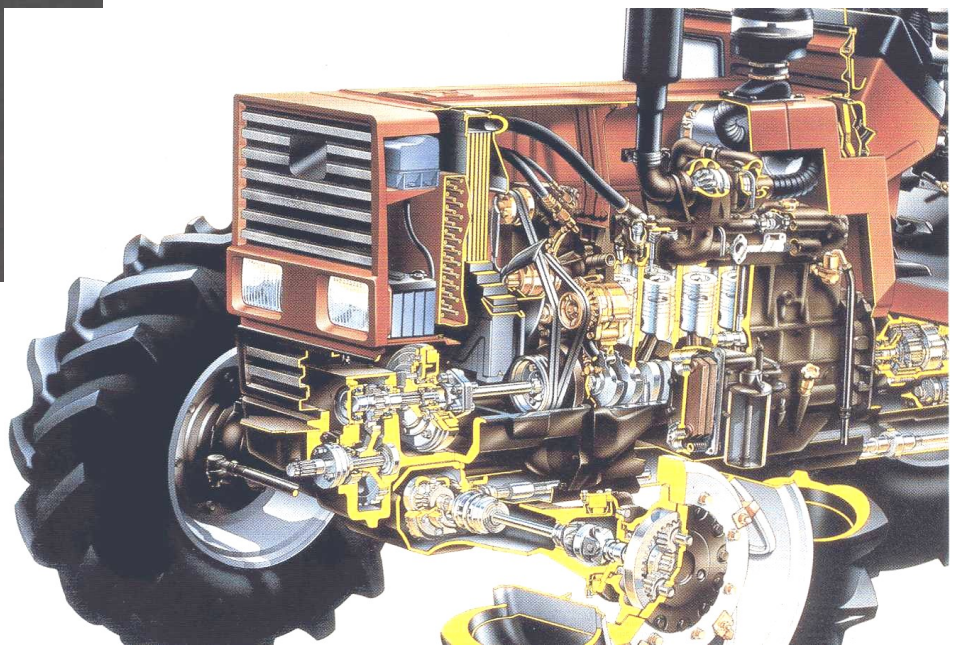
# Elevador y toma de fuerza frontales



ISO 8759-1- 2



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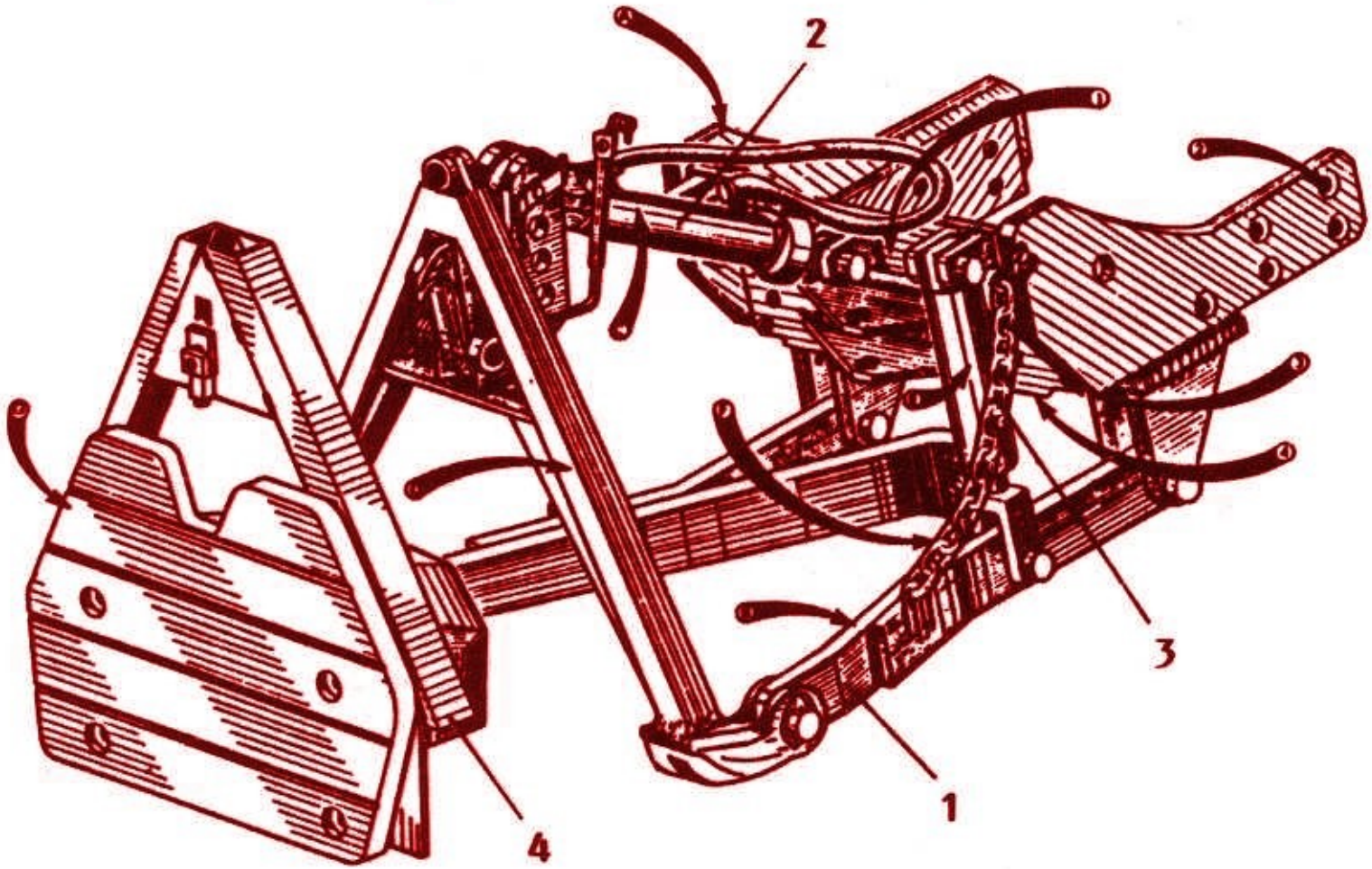
# Componentes del enganche frontal

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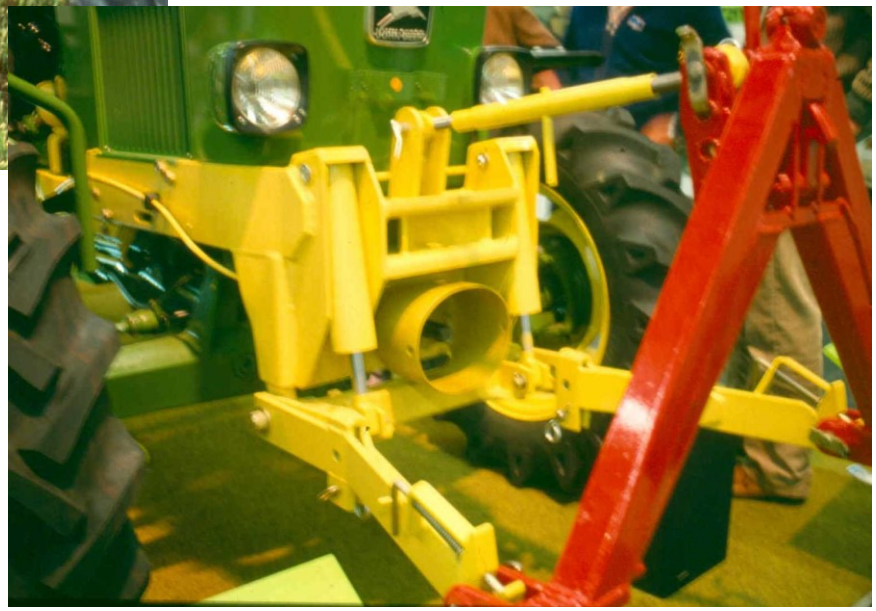
# Enganche y toma de fuerza frontal



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