



**Budapest University of Technology and Economics
Department of Construction Technology and Management**

Construction Equipment *Építőgépek*

Lifting & Transporting *Emelőgépek és szállítójárművek*

Edited by *Összeállította*: Dr. Zoltán A. Vattai

Budapest, 2010

Reconstruction of a roman crane
Római daru rekonstrukciója



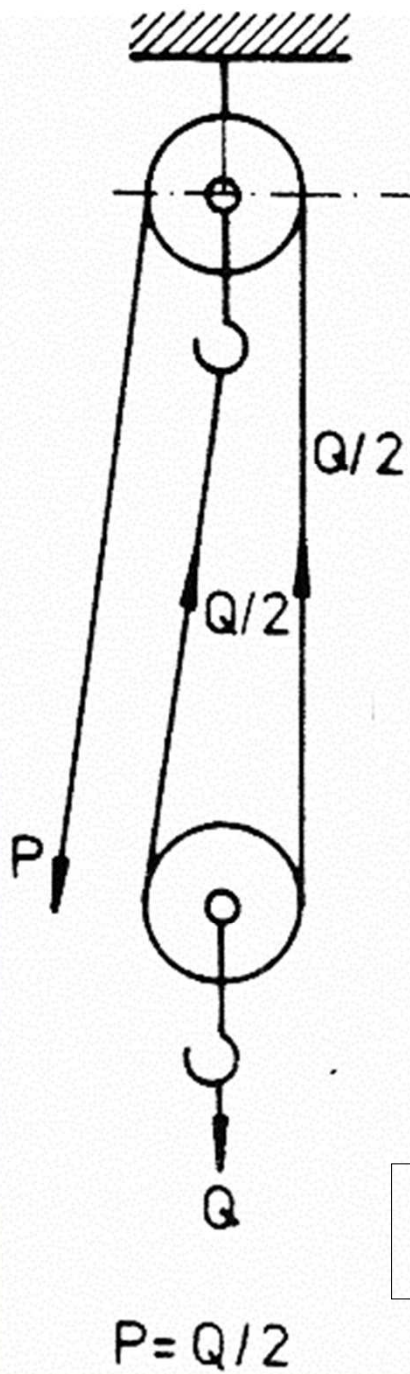


Reconstruction of the temple of Jerusalem *A jeruzsálemi templom újjáépítése*

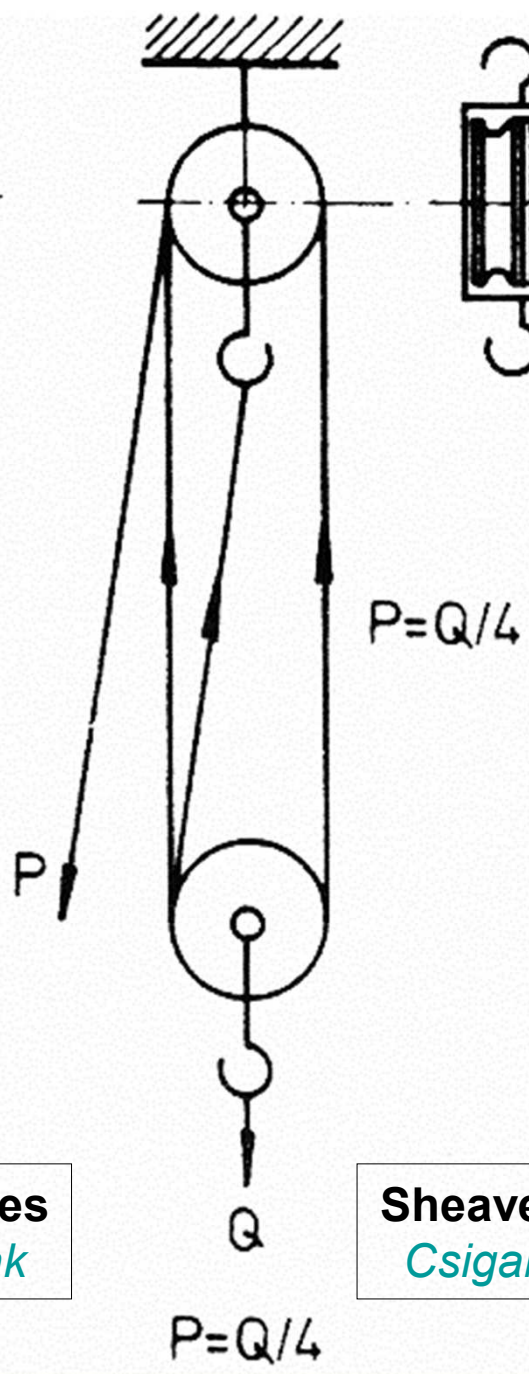


Treadle crane (Bruegel)
Taposókerekes daru (Bruegel festményén)

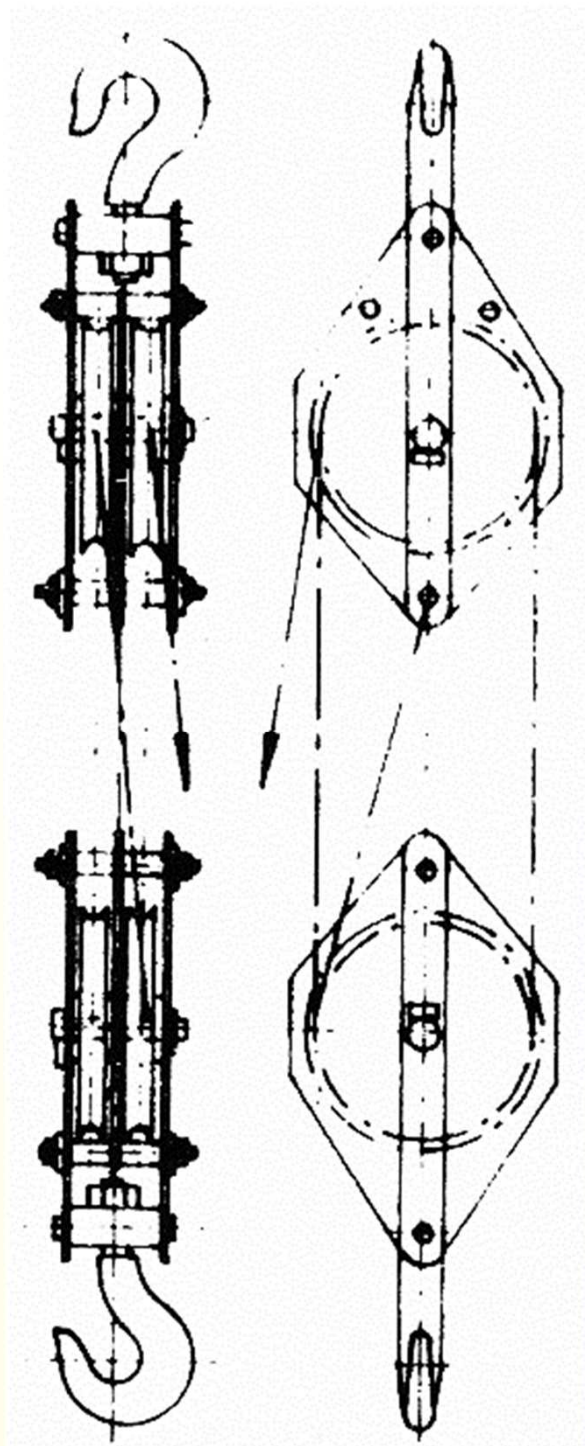


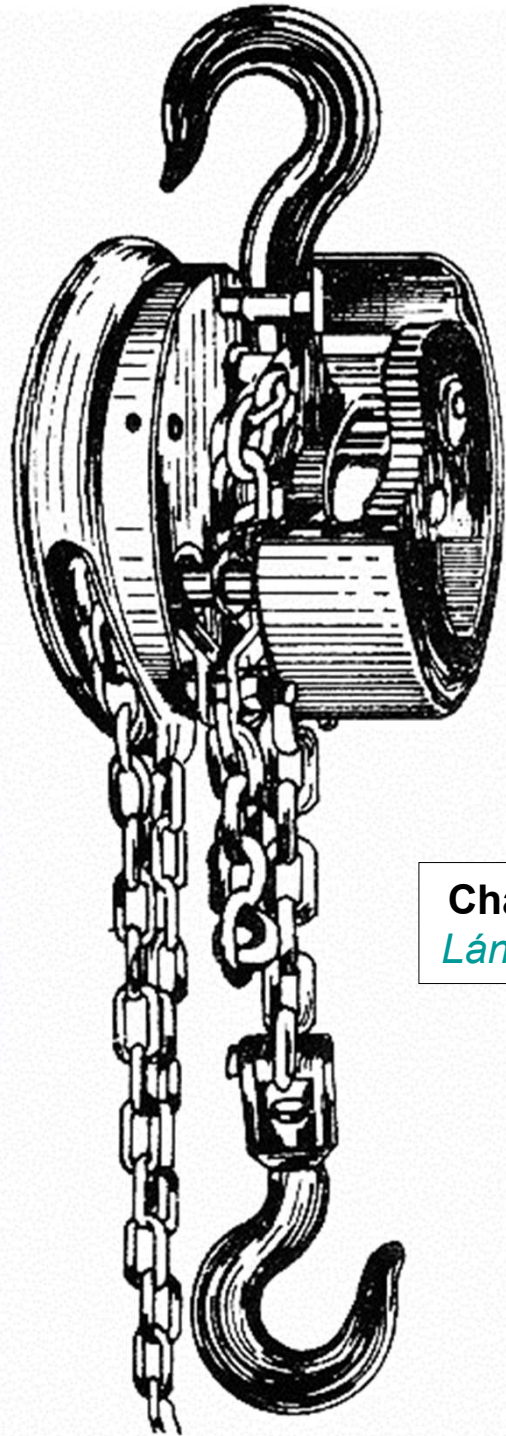


Sheaves
Csigák

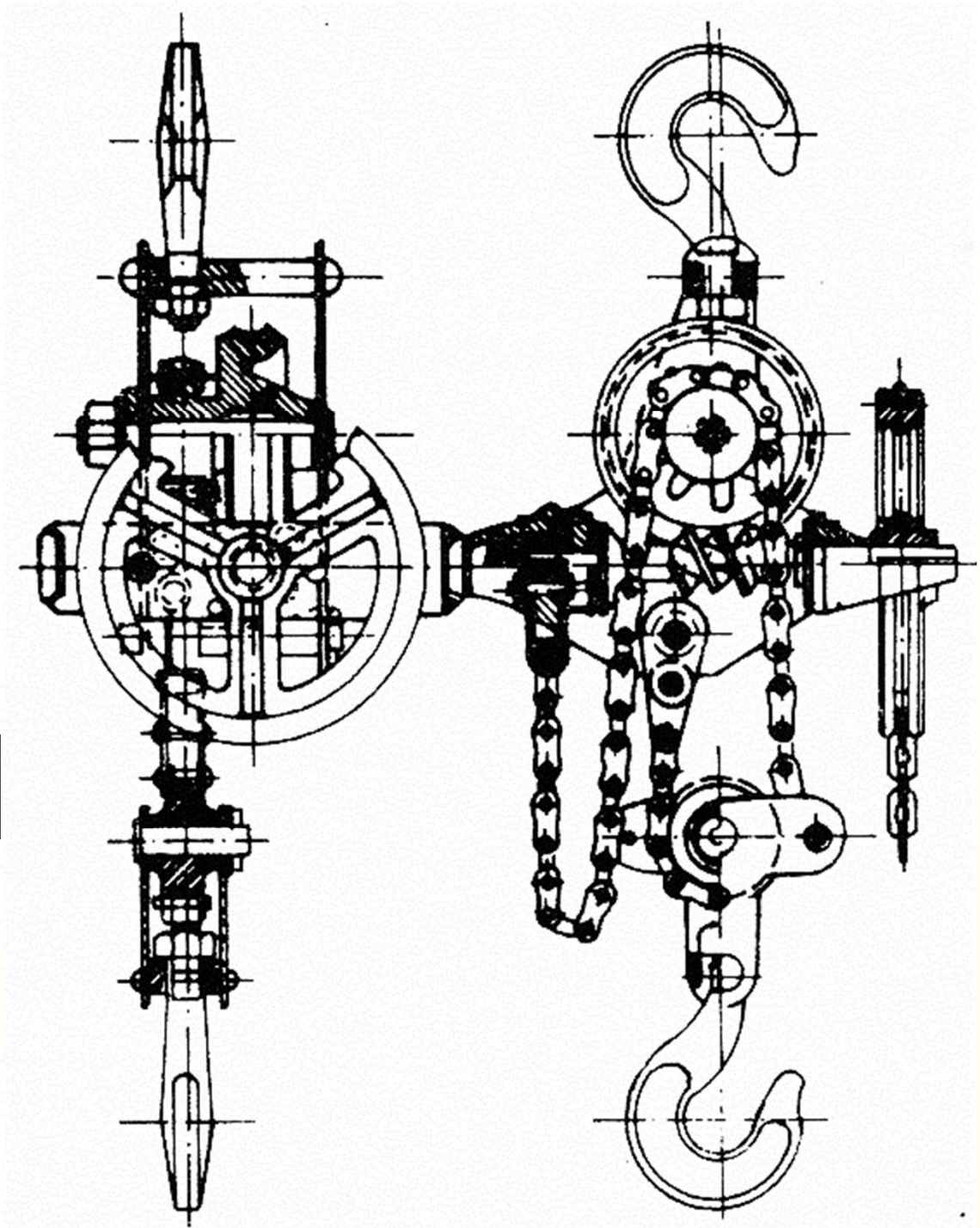


Sheave blocks
Csigablokkok

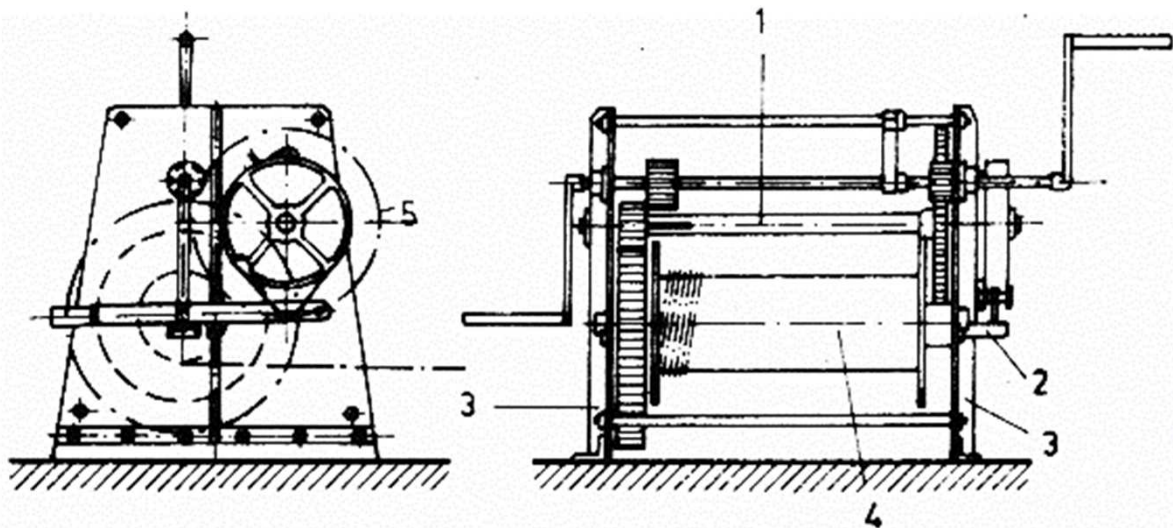




Chain pulley
Láncos emelő

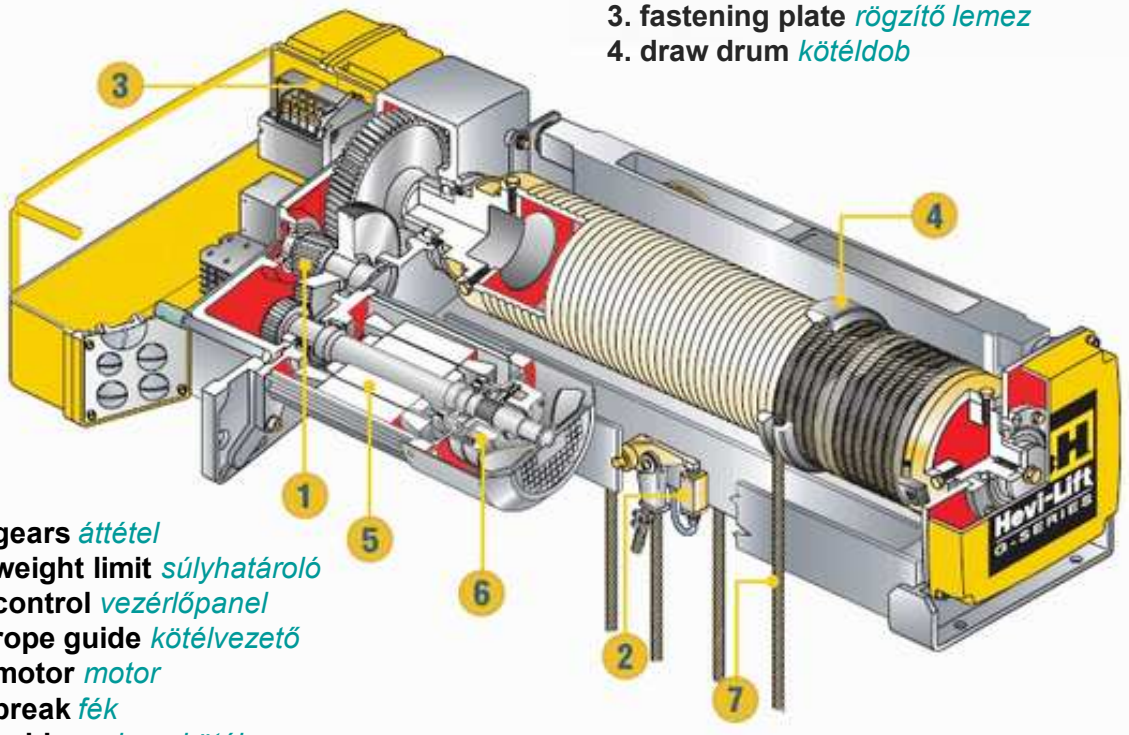
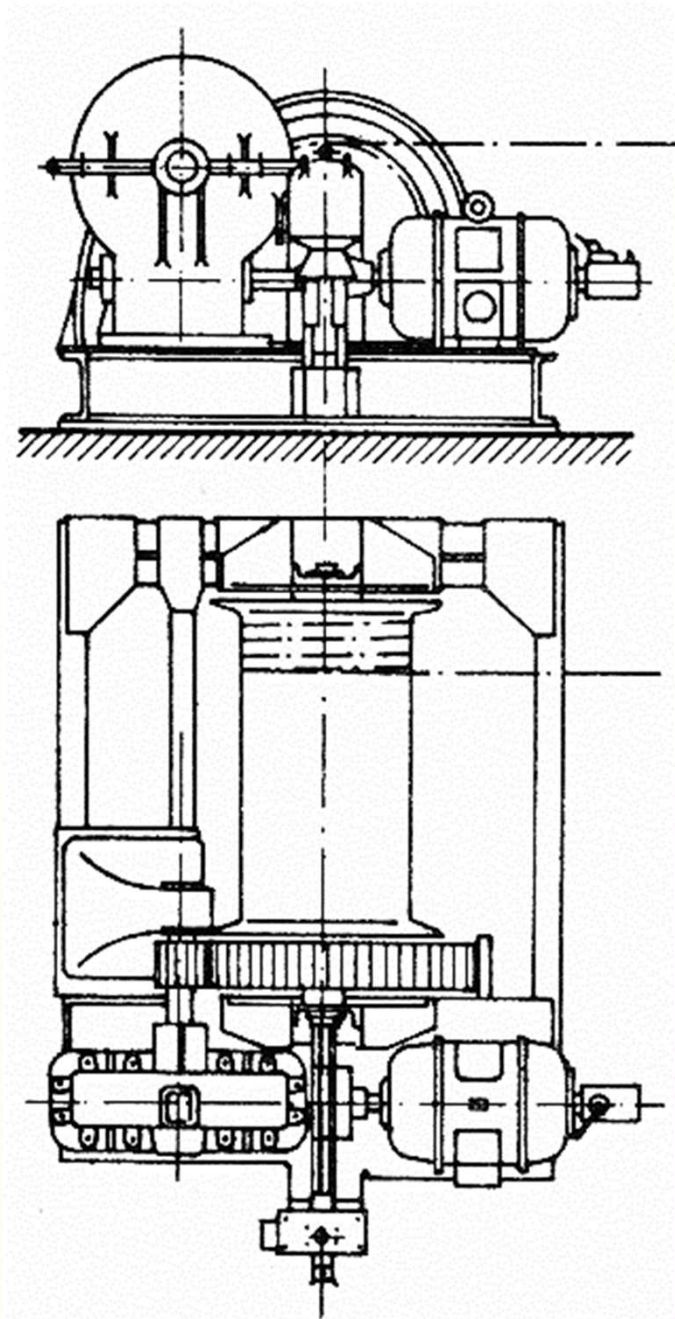


Manual winch *Kézi hajtású csörlő*

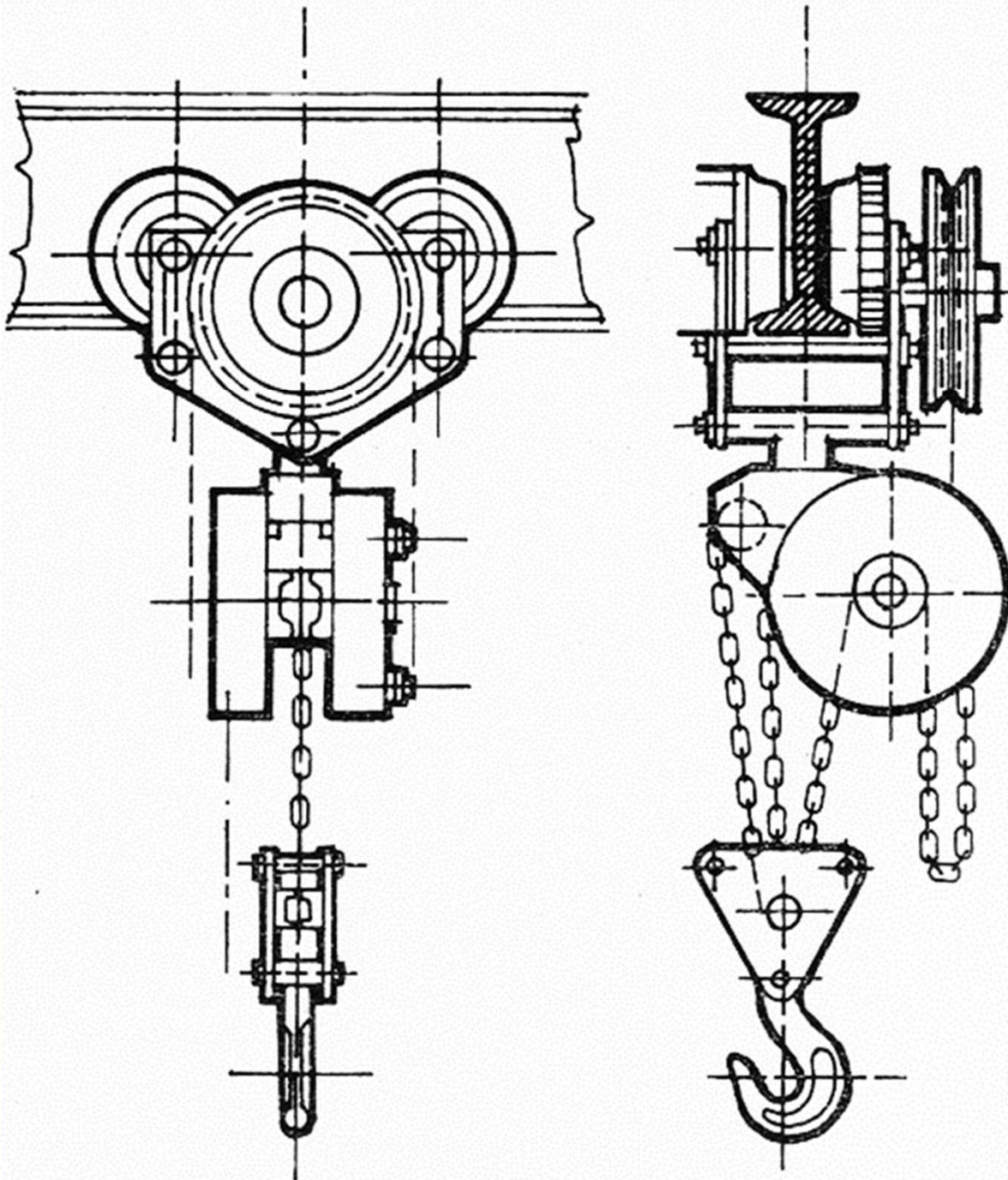


- 1. driving- and gear shaft *hajtó tengely*
- 2. layshaft of the drum *kötéldob tengely*
- 3. fastening plate *rögzítő lemez*
- 4. draw drum *kötéldob*

Machine winch *Gépi hajtású csörlő*

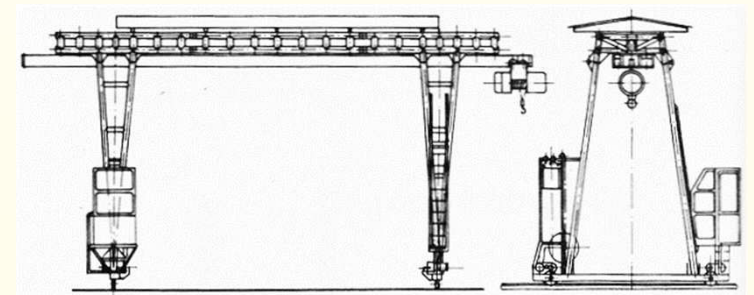


- 1. gears *áttétel*
- 2. weight limit *súlyhatároló*
- 3. control *vezérlőpanel*
- 4. rope guide *kötélvezető*
- 5. motor *motor*
- 6. break *fék*
- 7. cable *sodronykötél*

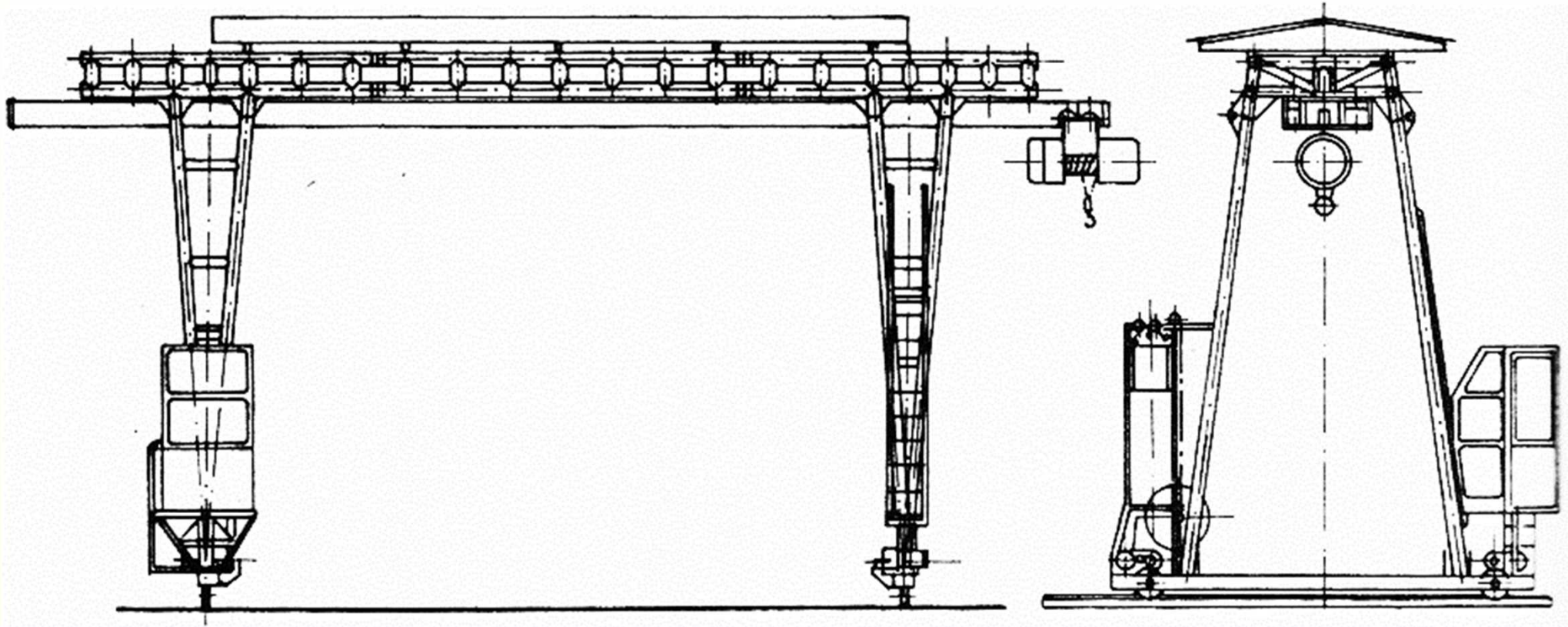


Crane Crab
„Futómacska”

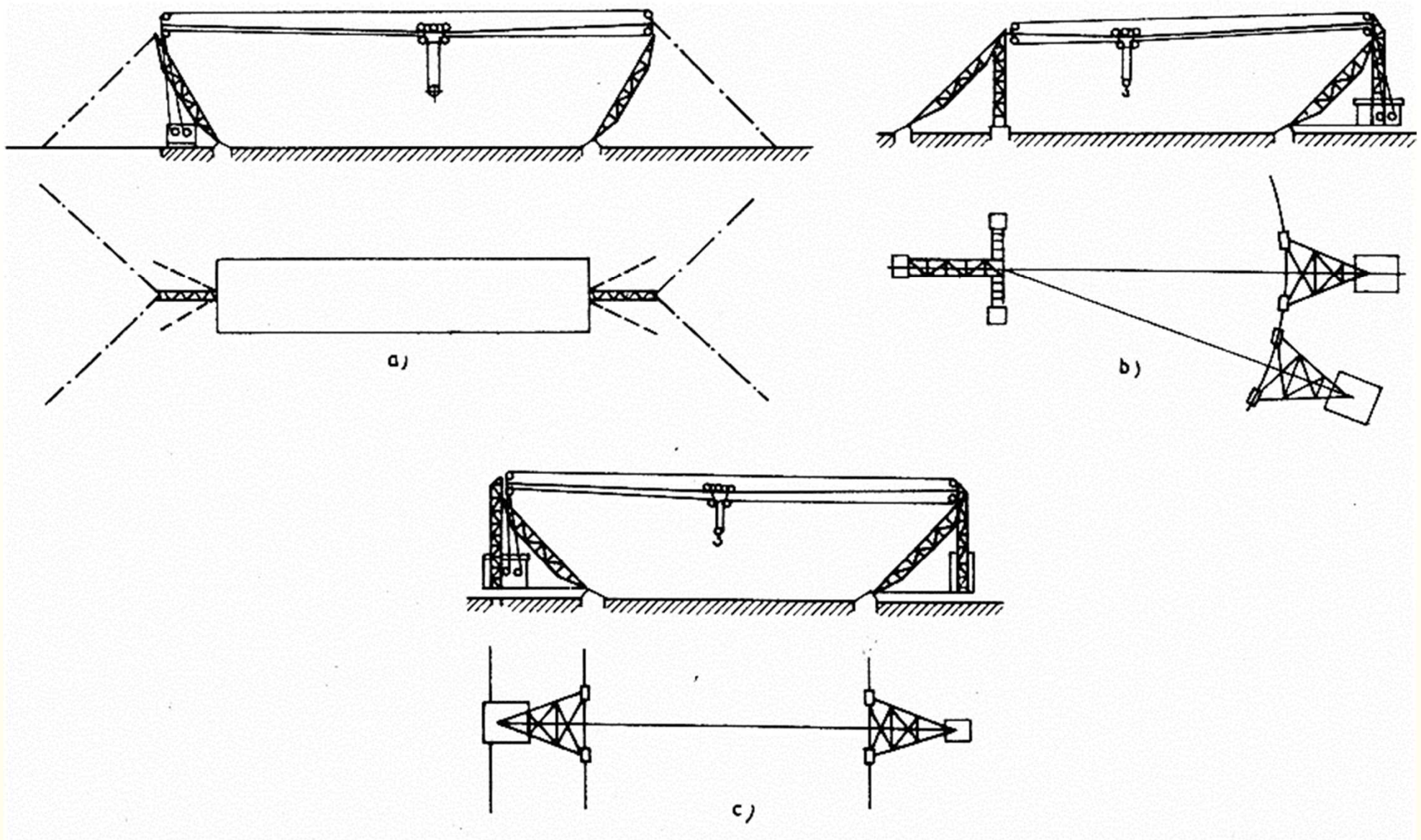
Gantry Crane
Bakdaru



Rail mounted , two-cantilevered Gantry Crane (Portal Crane)
Sínre telepített, két oldalán konzolos bakdaru (portáldaru)



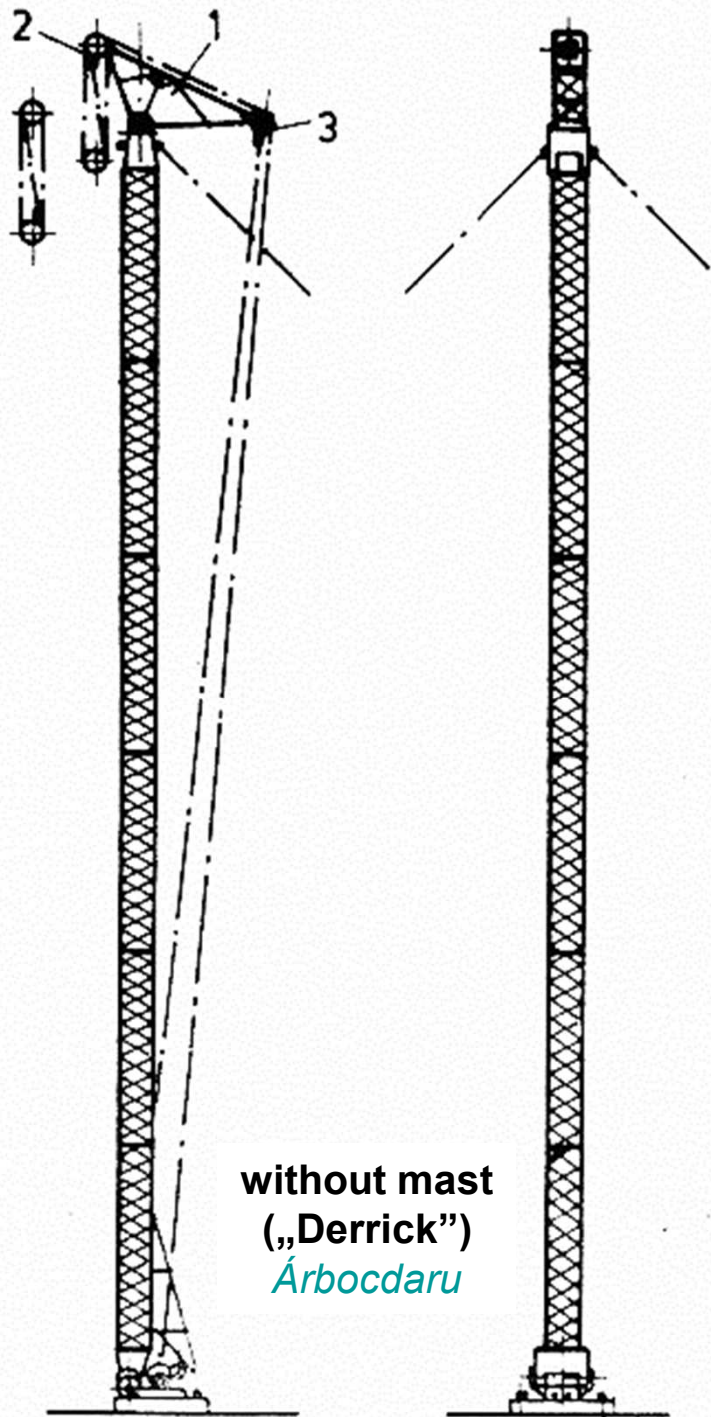
Cable Crane *Kábeldaru*



a. fix crane posts;
a. állóoszlopos;

b. fix post + curved rail mounted;
b. köríves sínen mozgó;

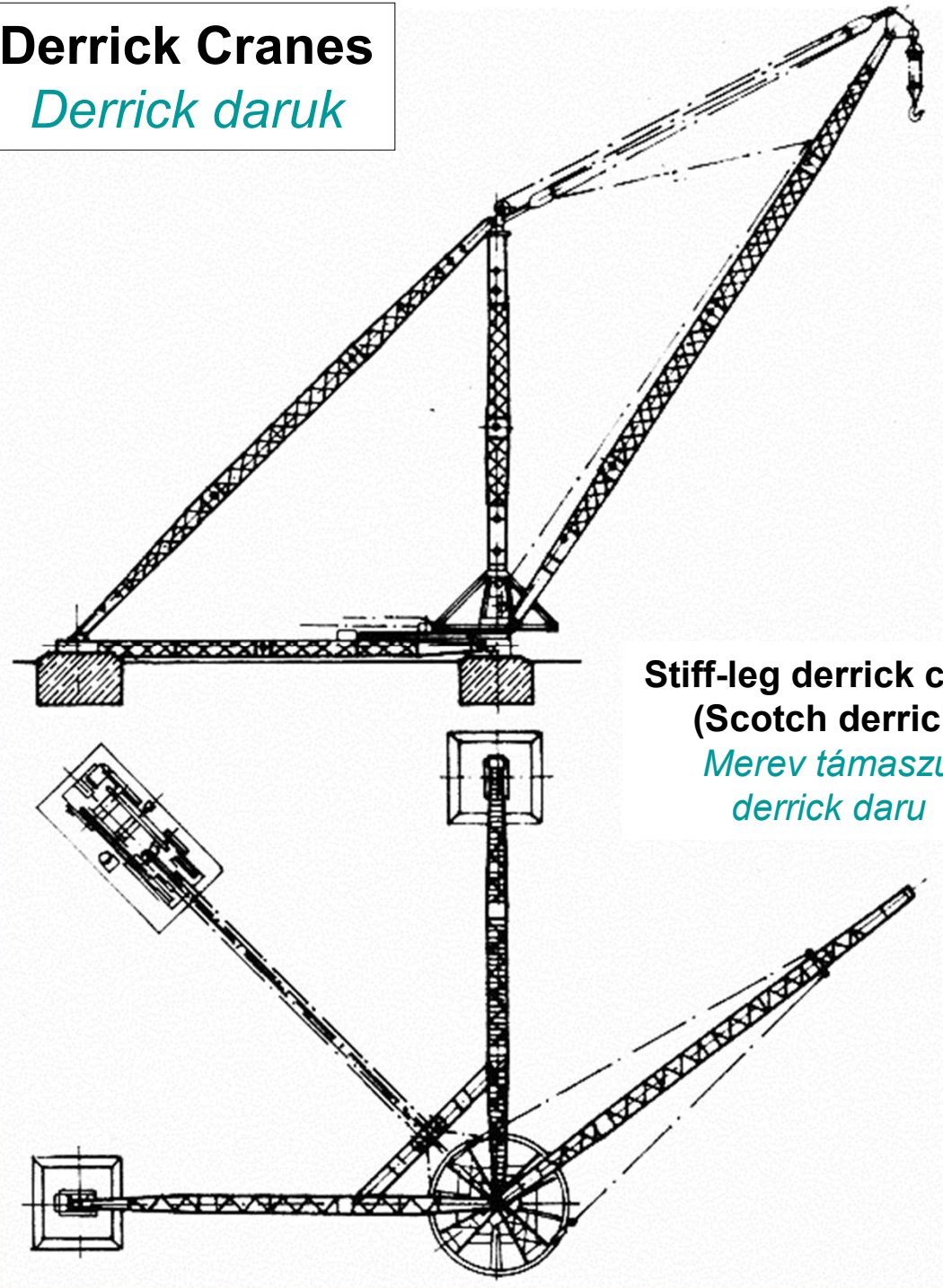
c. parallel rails mounted
c. párhuzamos sínen mozgó



without mast
(„Derrick”)
Árbocdaru

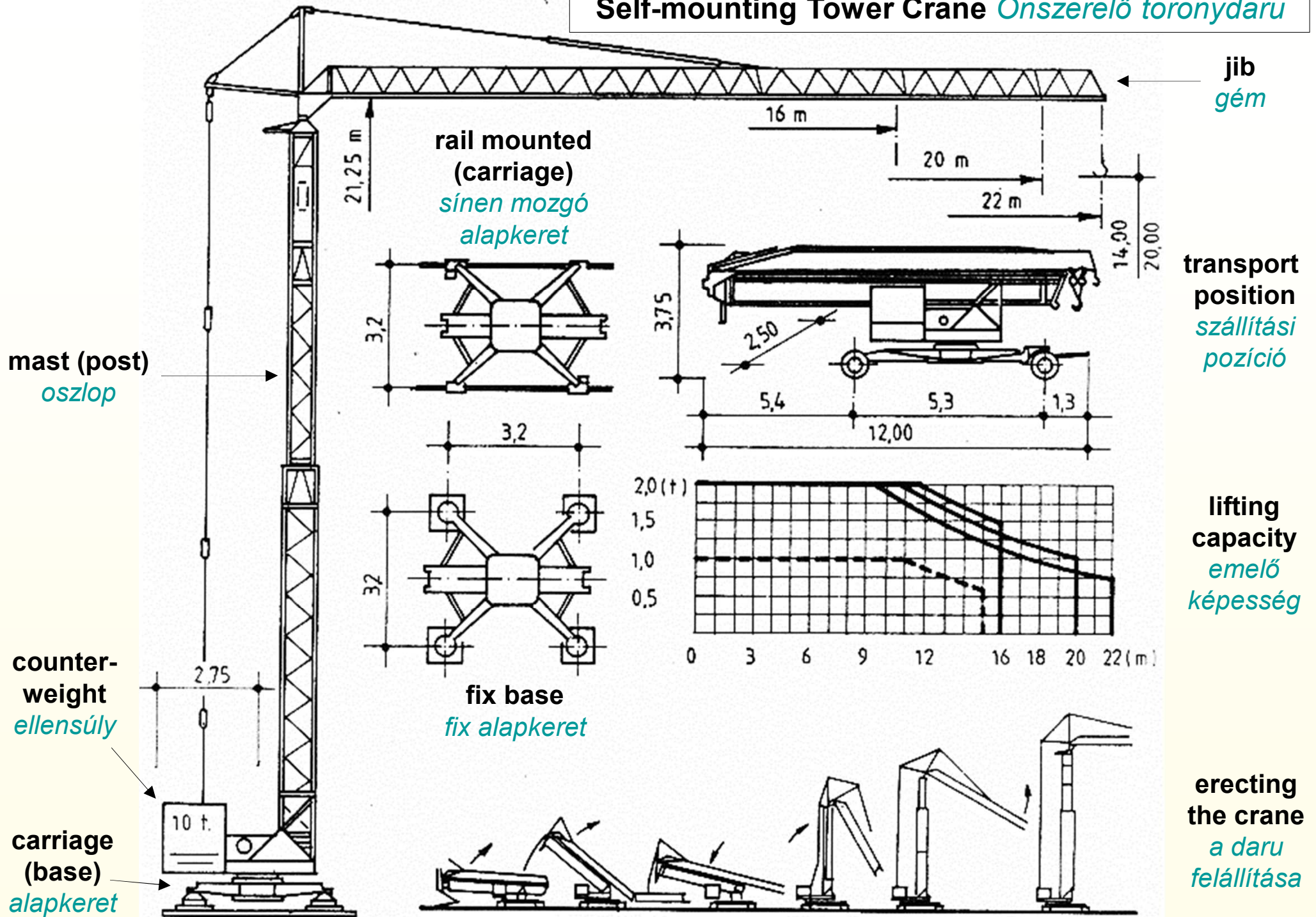
Derrick Cranes

Derrick daruk



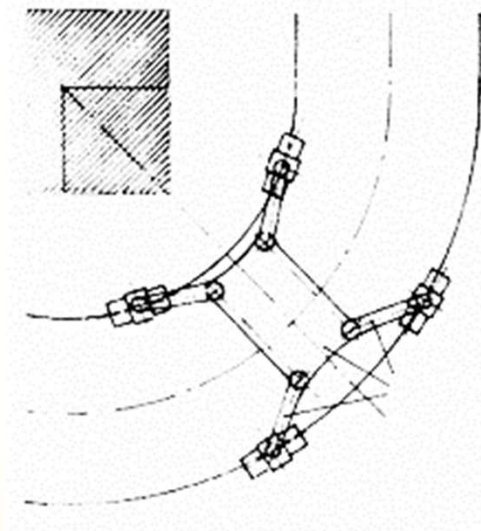
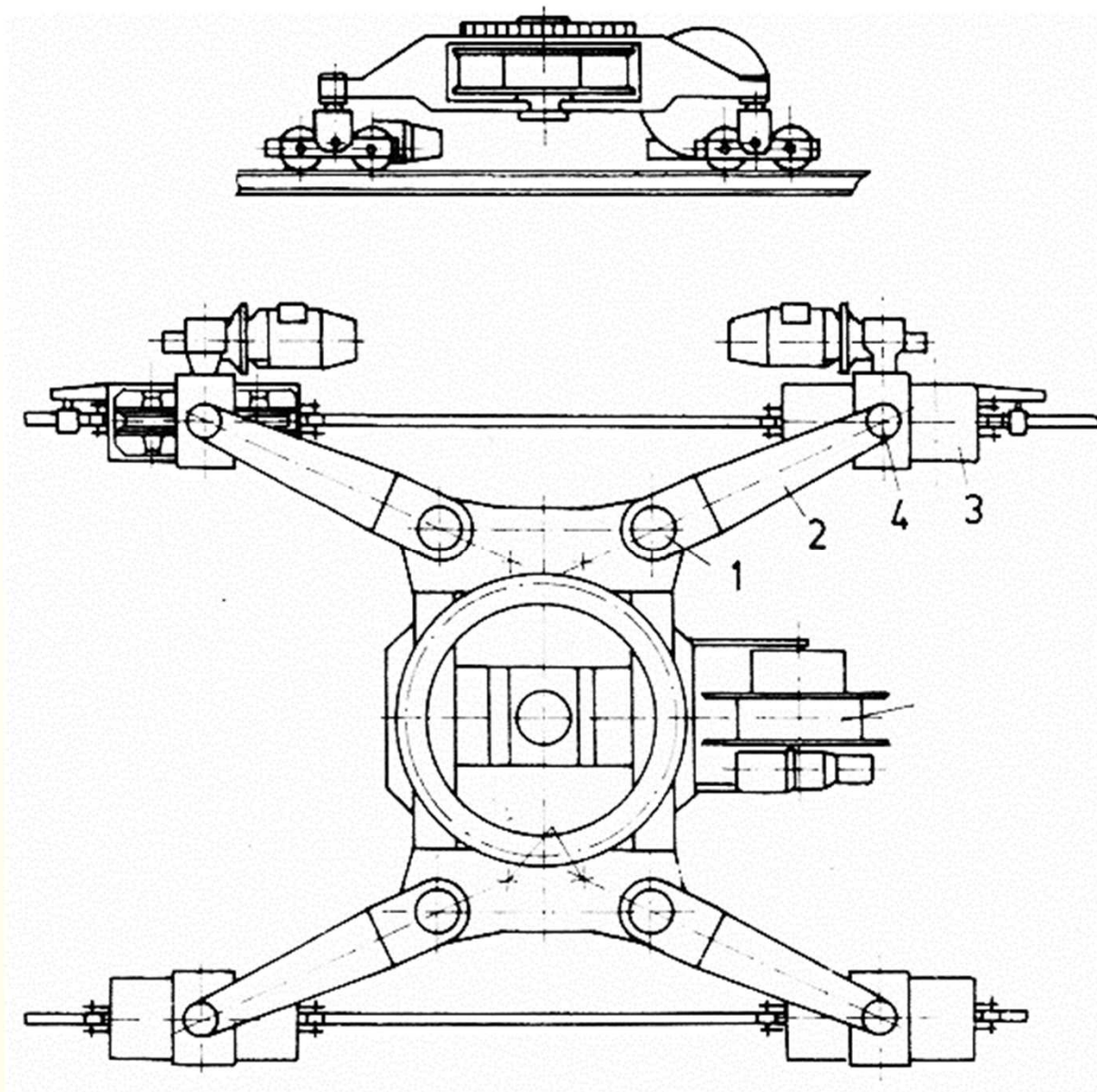
Stiff-leg derrick crane
(Scotch derrick)
*Merev támaszú
derrick daru*

Self-mounting Tower Crane *Önszerelő toronydaru*

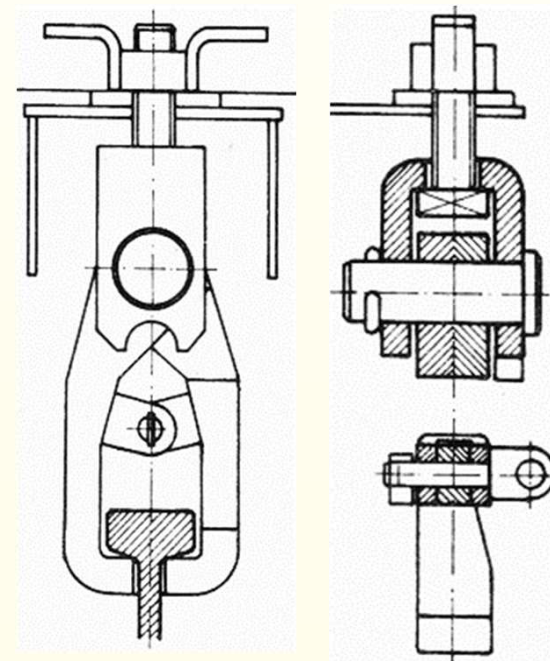


Tower crane carriage (bogie)

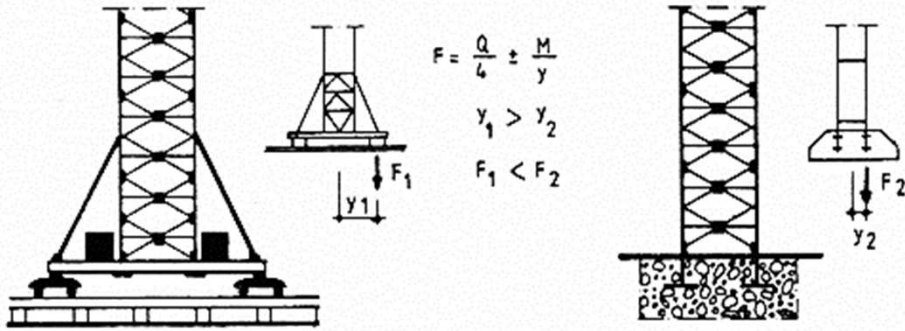
Sínen mozgó toronydaru alapteret (járómű)



grip break
sínfogó
(rögzítőfék)

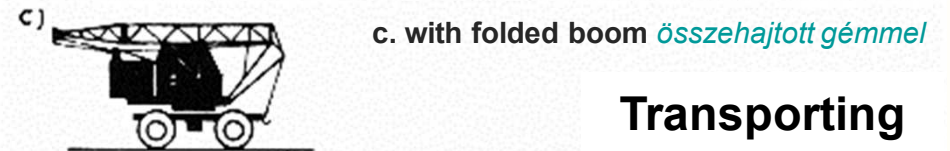
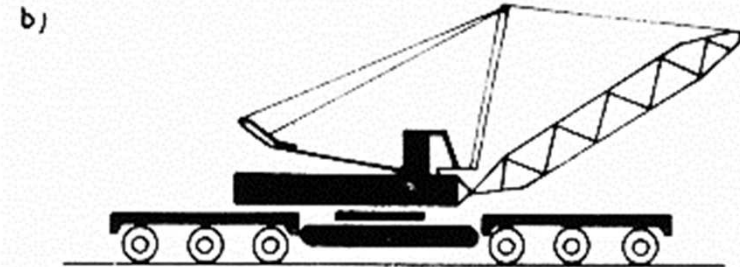
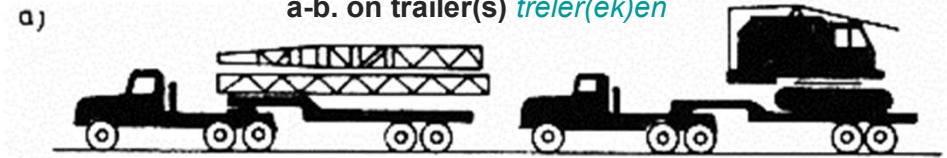
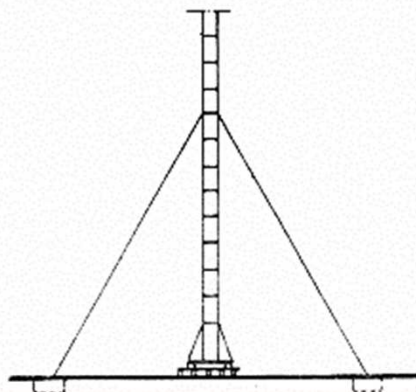
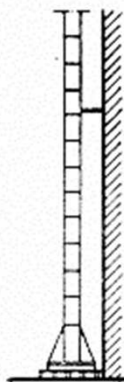
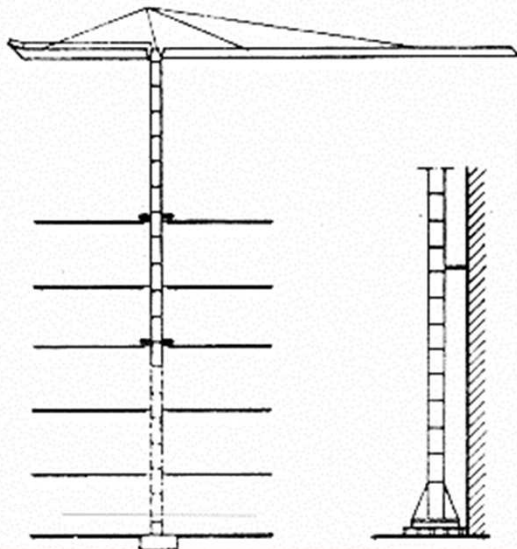
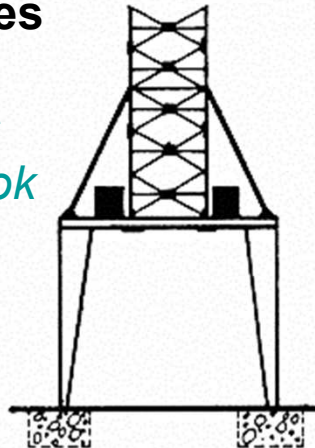


1. pivot *csap*; 2. box girder *szekrénytartó*; 3. wheel-box *kerékszekrény*; 4. king-pin *királycsap*

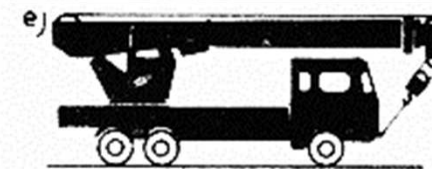


Bases and braces of tower cranes

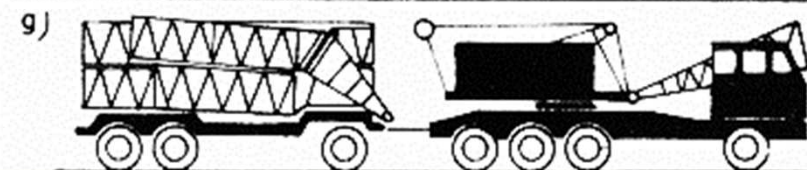
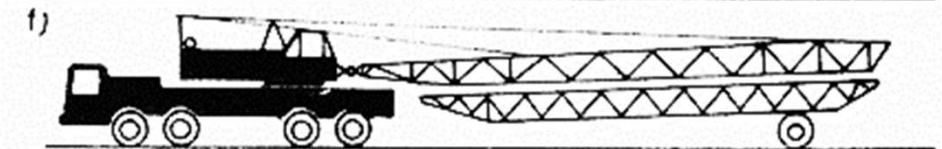
*Toronydaru
alpozási és
rögzítési módok*



d-e. with retracted boom *behúzott gémmel*

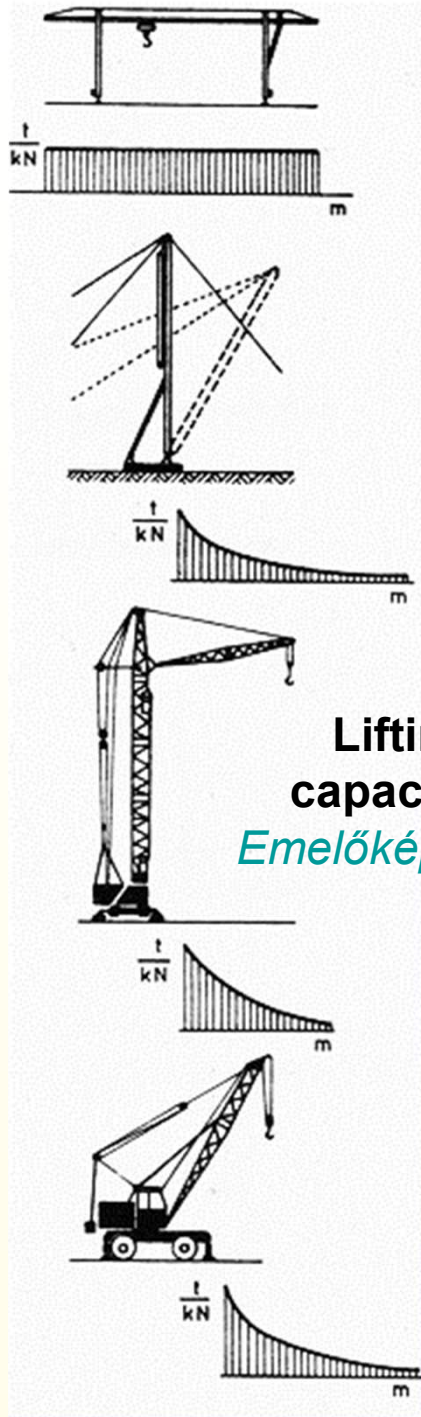


f-g. long vehicle (train)
vontatott járműszerelvénként

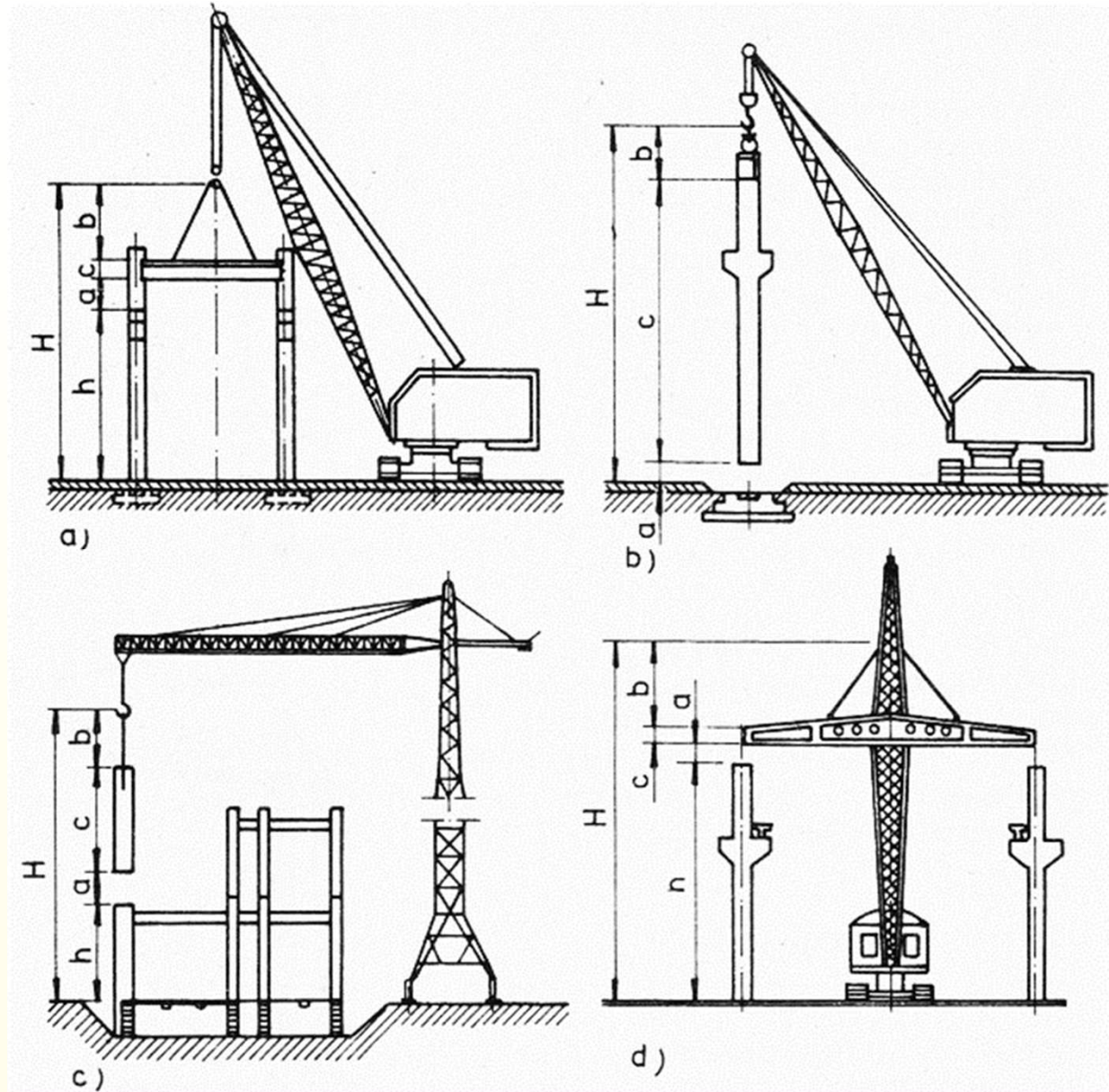


Transporting tower cranes
*Toronydaruk
szállítása*

Calculating necessary hook-height (H) Szükséges horogmagasság (H) meghatározása

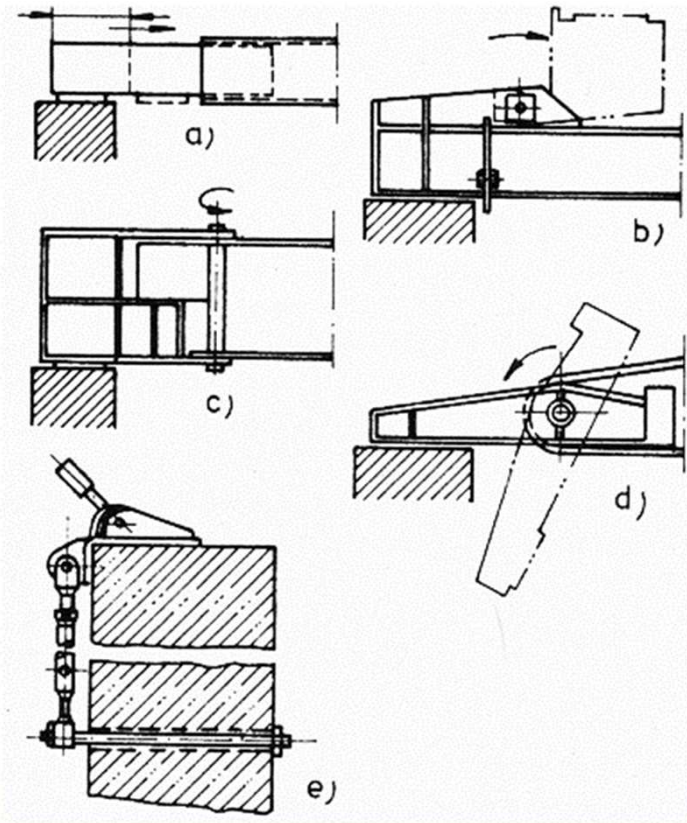


Lifting capacities
Emelőképesség

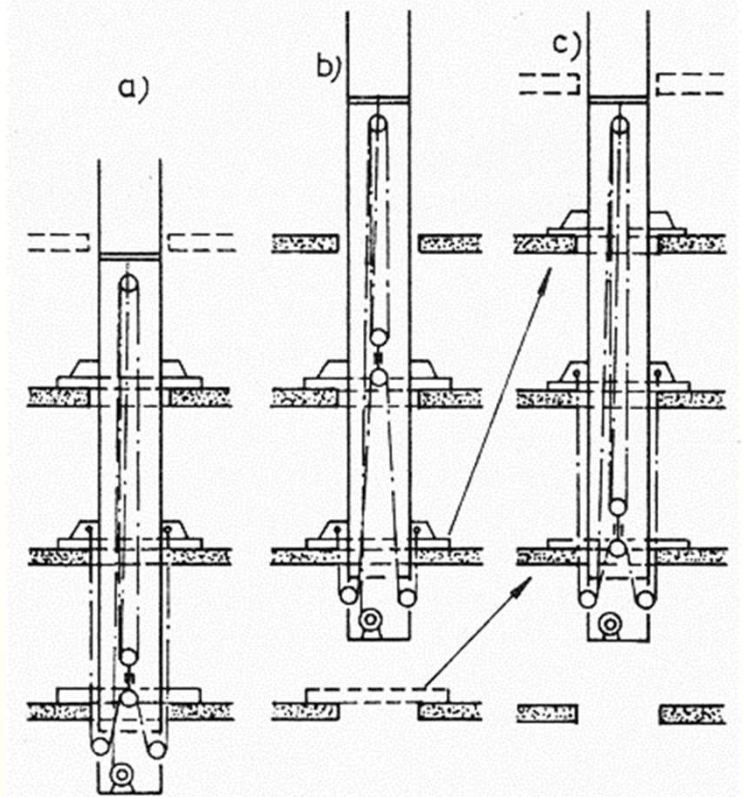


a. hogging; b. spreader height; c. member height; h. level of placement less level of crane footing
a. túlemelés; b. himba magasság; c. elem magasság; h. elem végső pozíció és darualap szintkülönbsége

Climbing Crane Kúszódaru



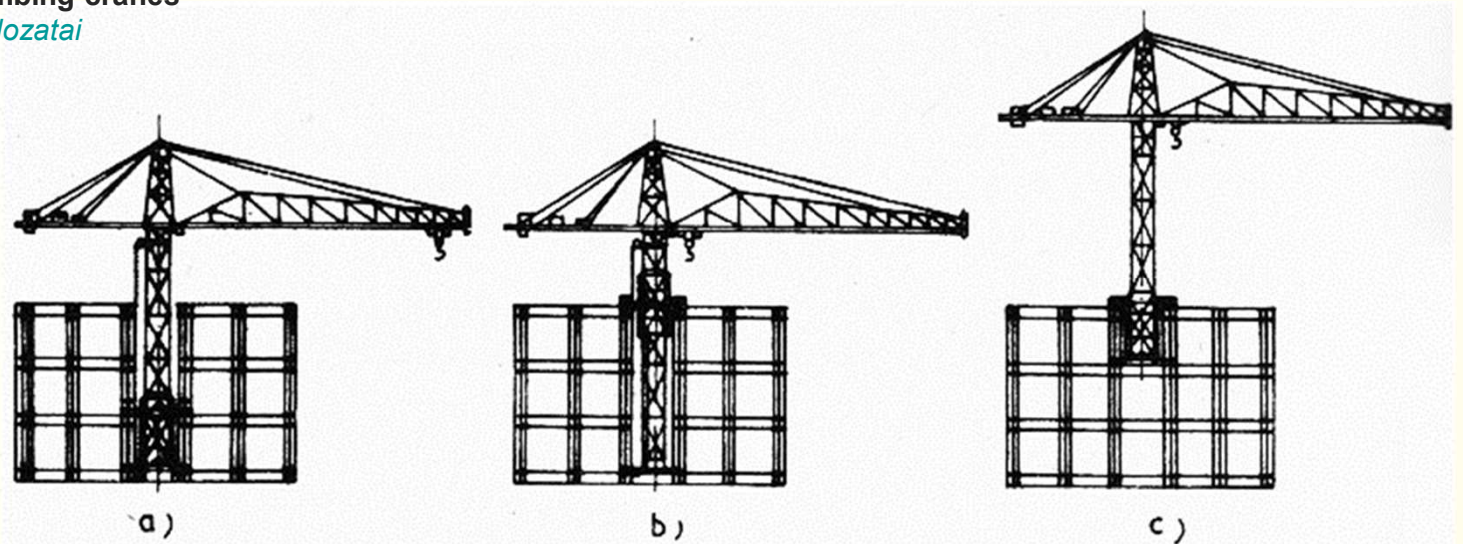
Load-bearing structure of the building must be designed for the weight and climb of the crane
A kúszódaru súlyából és mozgásából származó többlet-teherre a teherhodó szerkezetet méretezni kell



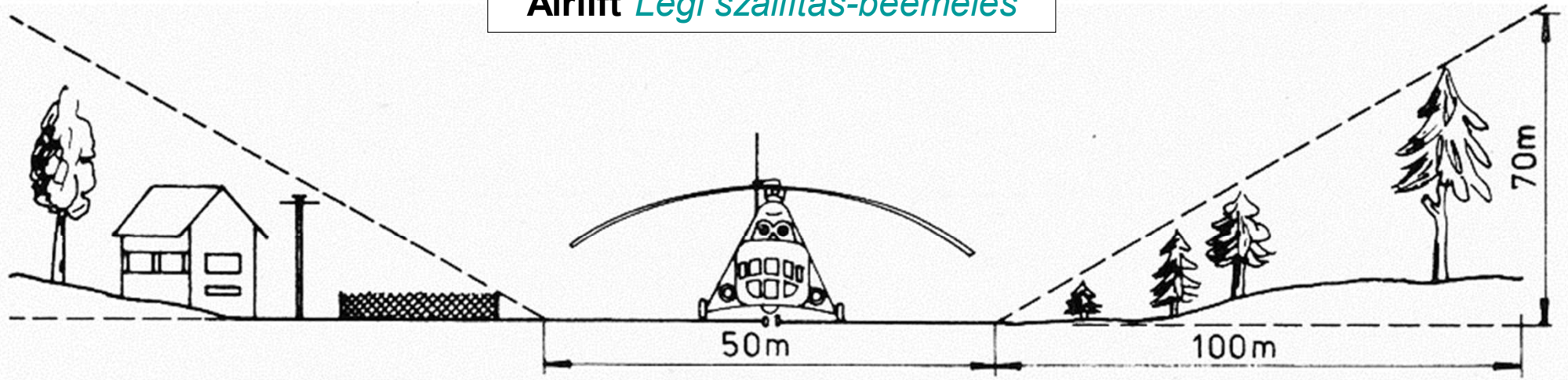
a. start position; b. climbing; c. preparation for next climb
a. induló helyzet; b. kúsztatás; c. előkészítés a következő kúsztatásra

a-e. different types of bearings of climbing cranes
a-e. kúszódaruk alátámasztásának módoszatai

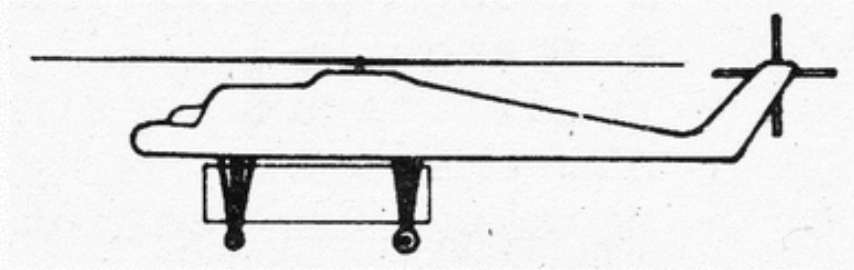
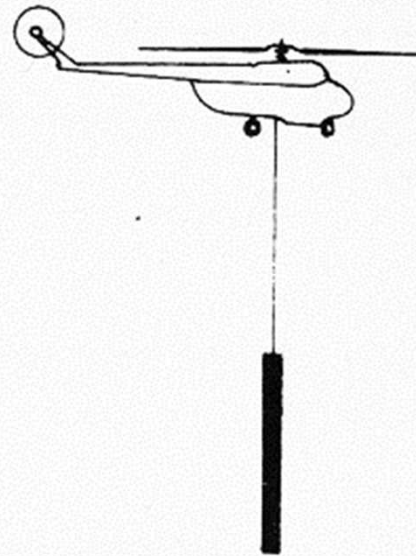
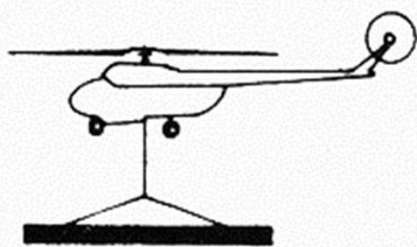
Telescopic Mast:
 a. start position;
 b. lifting bush;
 c. climbing and fixing
*Teleszkópikus oszlop:
 a. induló helyzet
 b. (külső) keret emelése
 c. kúsztatás és rögzítés*



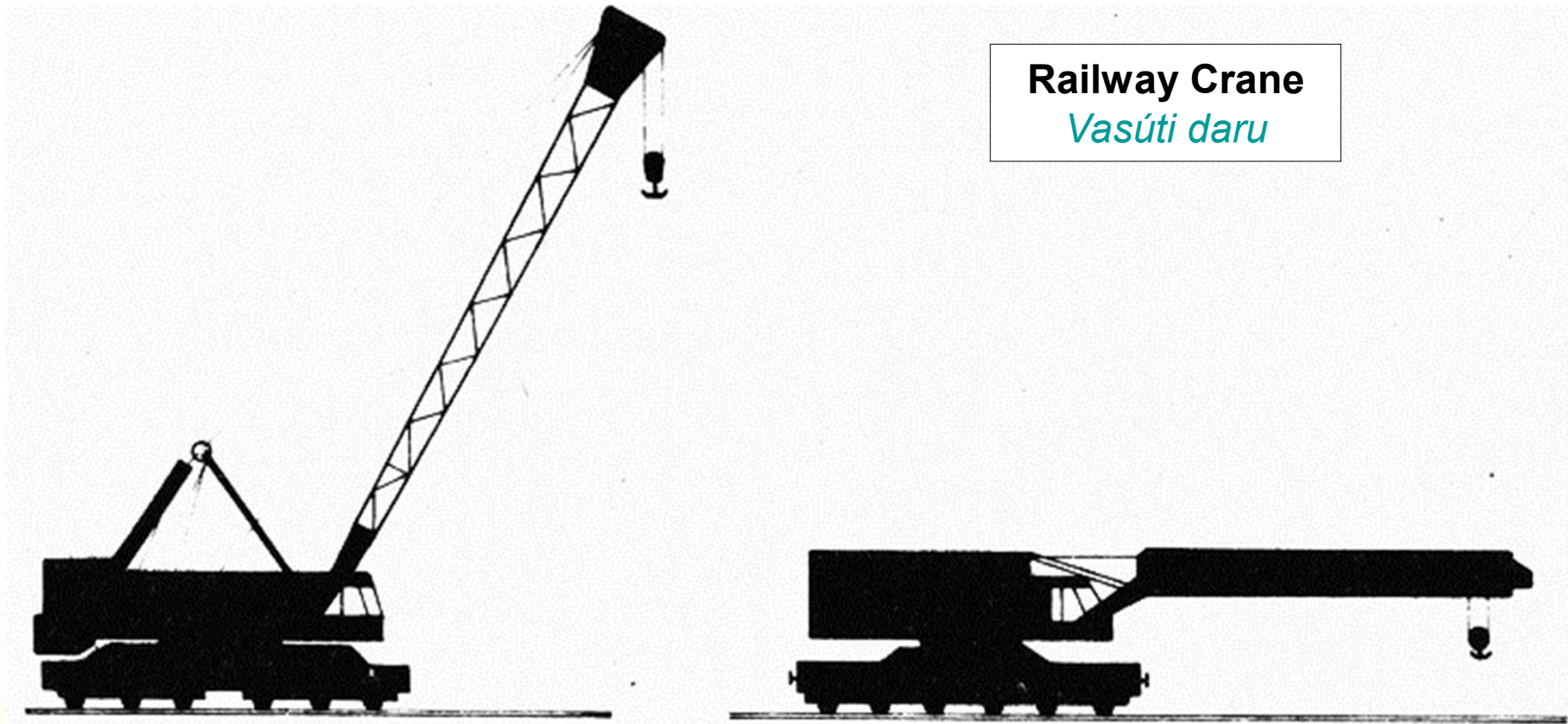
Airlift *Légi szállítás-beemelés*



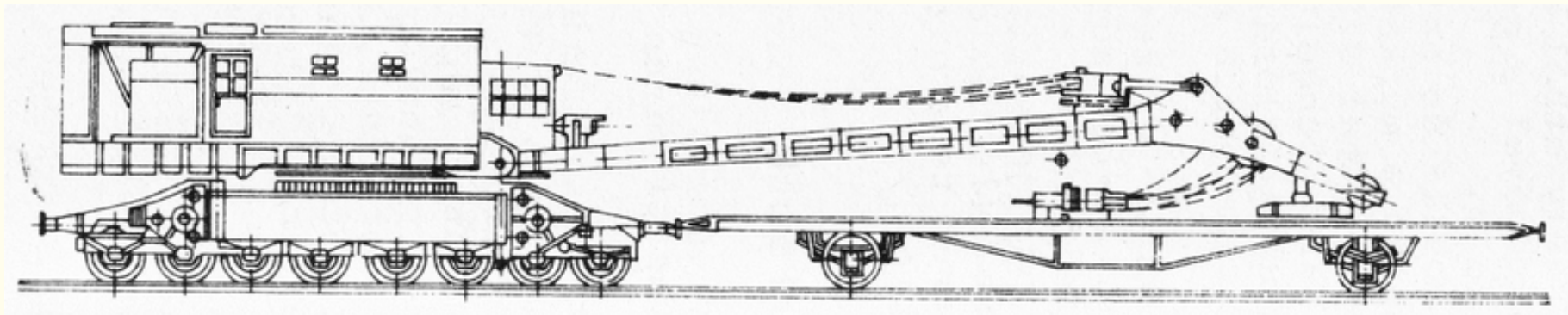
Necessary free landing (and take-off) zone *Le- és felszálláshoz szükséges szabad tér*



Load positions: hung on short rope, horizontally; hung on long rope, vertically; fixed to the shell body (or to legs)
Teher-pozíciók: rövid kötélén vízszintes pozícióban; hosszú kötélén függőleges pozícióban; helikopter-törzshöz rögzítve

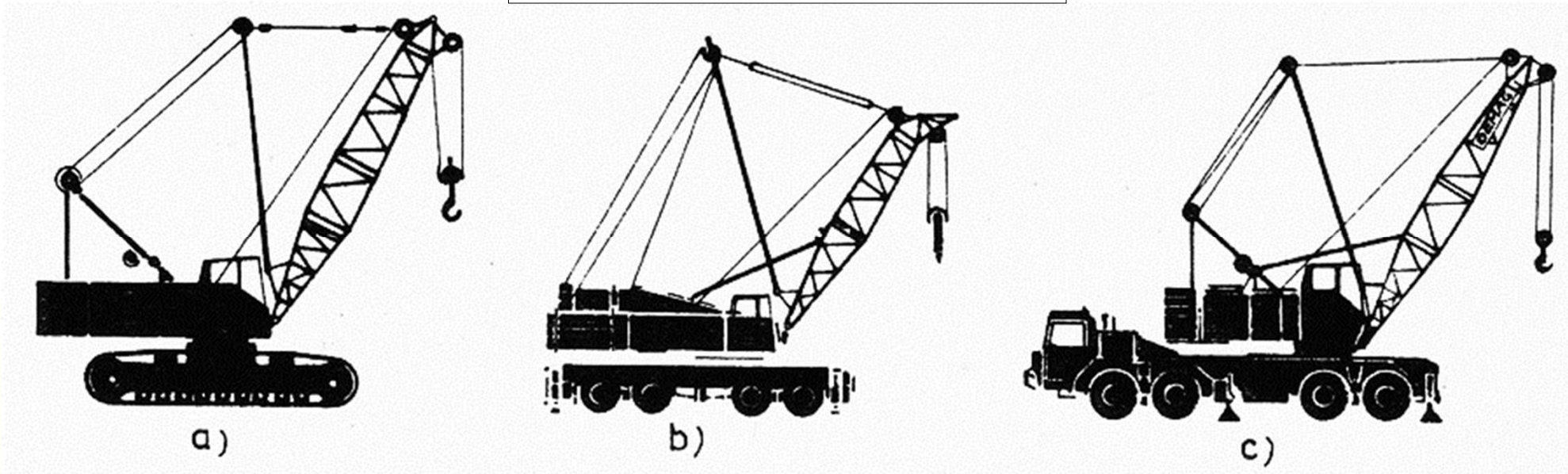


Railway Crane
Vasúti daru



Railway crane in travelling (riding) position *Vasúti daru utató pozícióban*

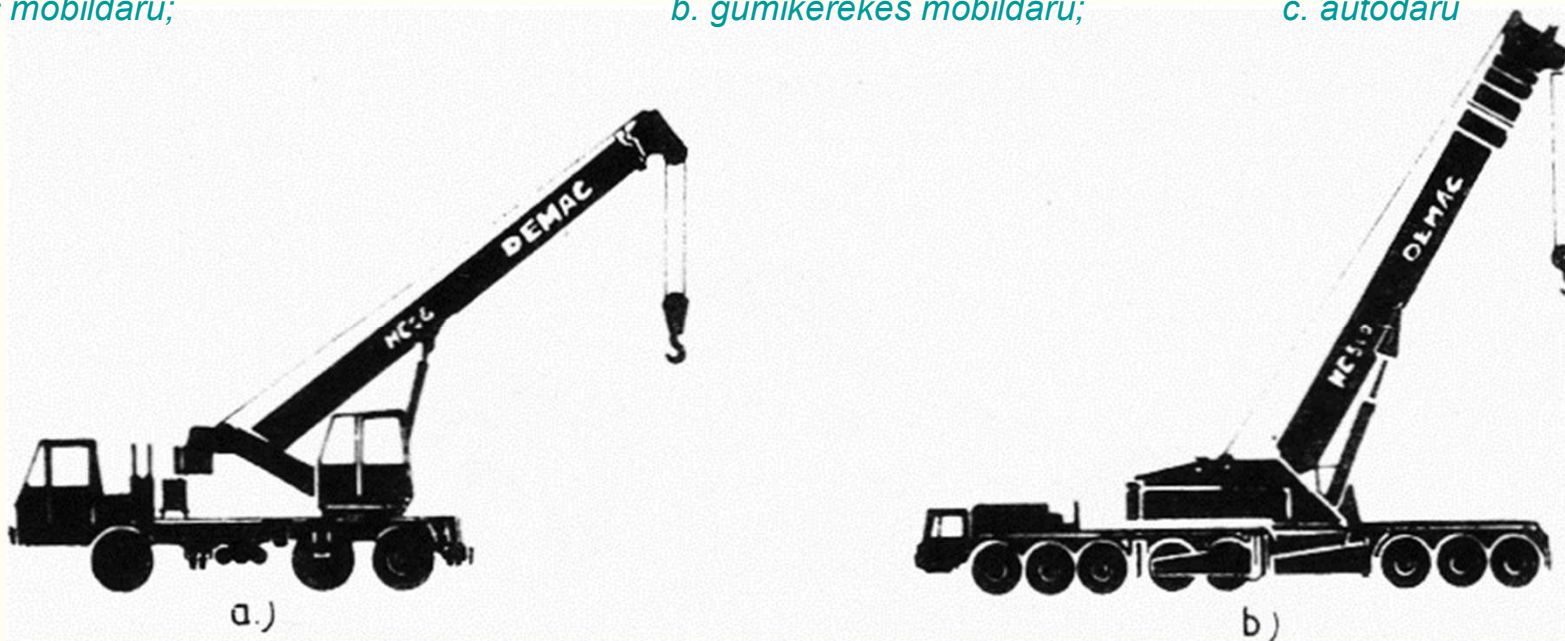
Vehicle Cranes *Járműdaruk*



a. track mounted mobile crane (crawler crane);
a. lánctalpas mobildaru;

b. wheel mounted mobile crane;
b. gumikerekes mobildaru;

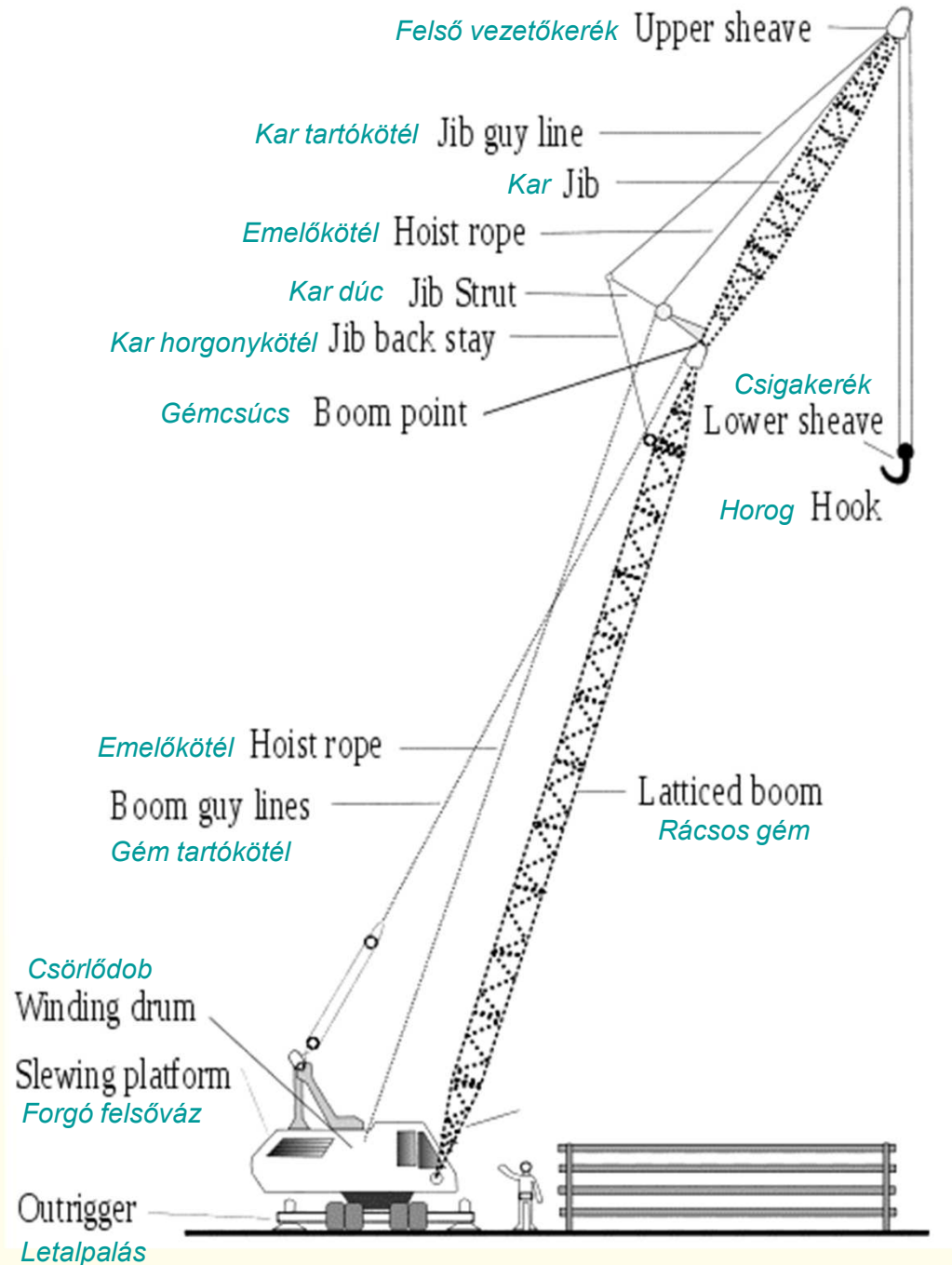
c. autocrane
c. autódaru



a. general truck carriage (for smaller cranes);
a. tehergépjármű alvázra szerelt (kisebb) járműdaru;

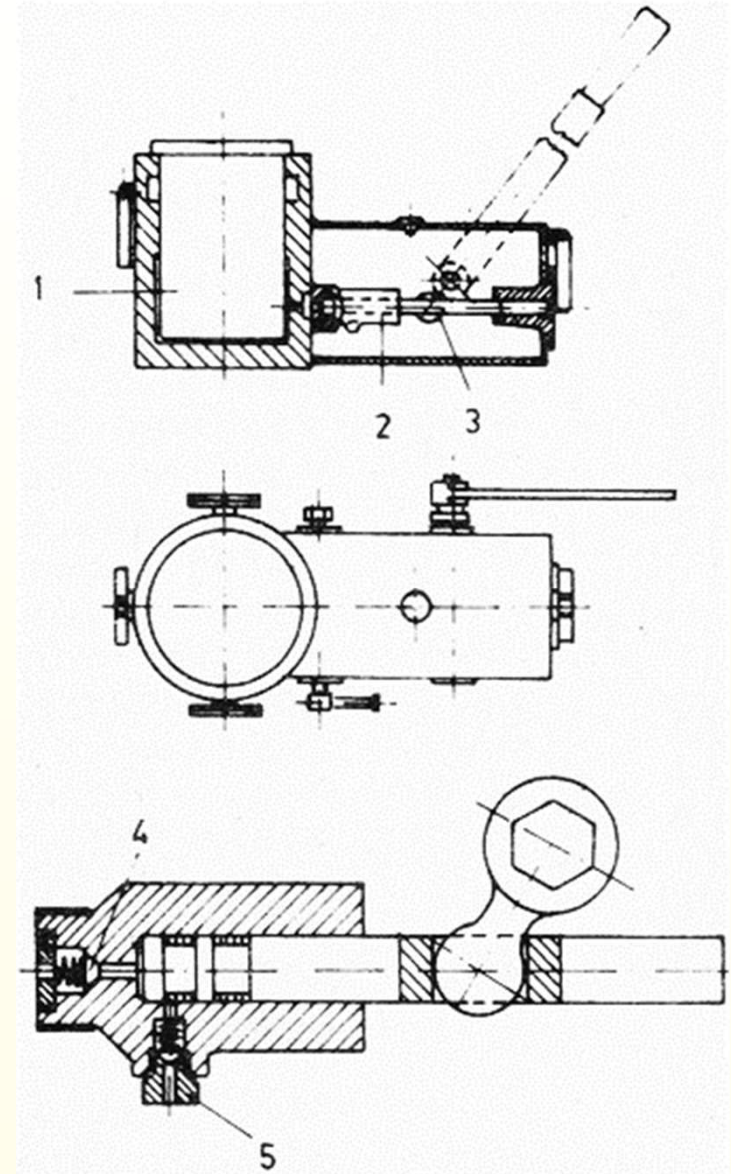
b. special carriage (for bigger cranes)
b. különleges alvázra szerelt (nagyobb) járműdaru

Lattice-boom mobile crane *Rácsos gémmű mobildaru*



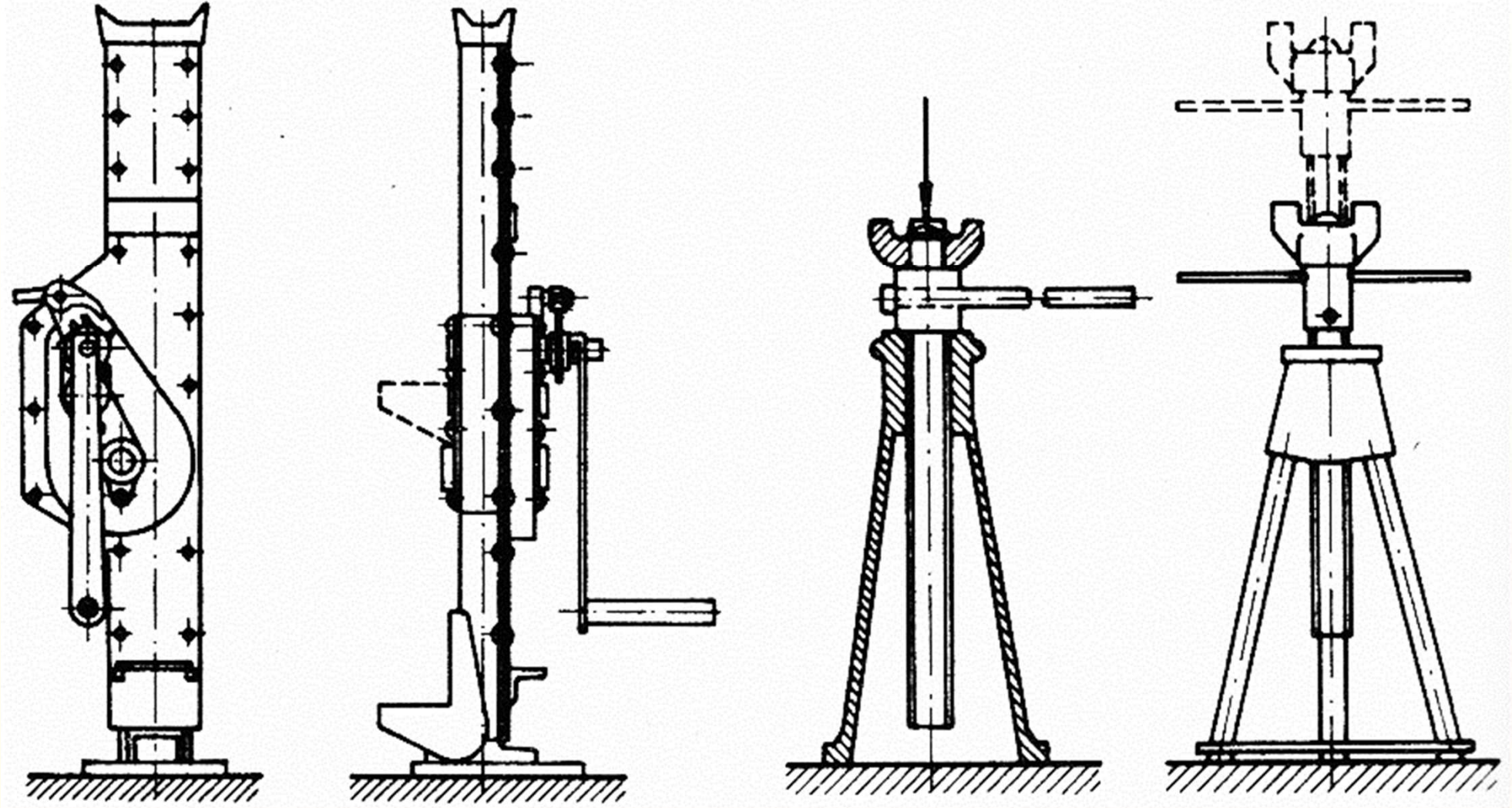
Hydraulic jack *Hidraulikus emelő*

1. cylinder *munkahenger*
2. piston (pump) *dugattyú (pumpa)*
3. camshaft *tengely*
4. delivery valve *nyomó (emelő) szelep*
5. admission valve *szívó (leeresztő) szelep*



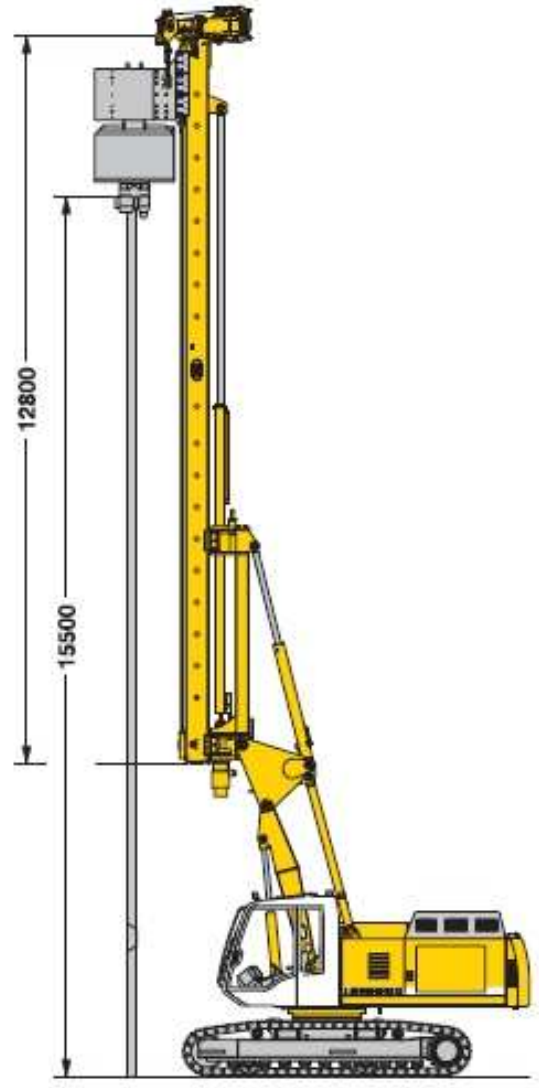
Ratchet jack
Fogasléces emelő

Screw jack (tripod jack)
Orsós emelő (állványos emelő)

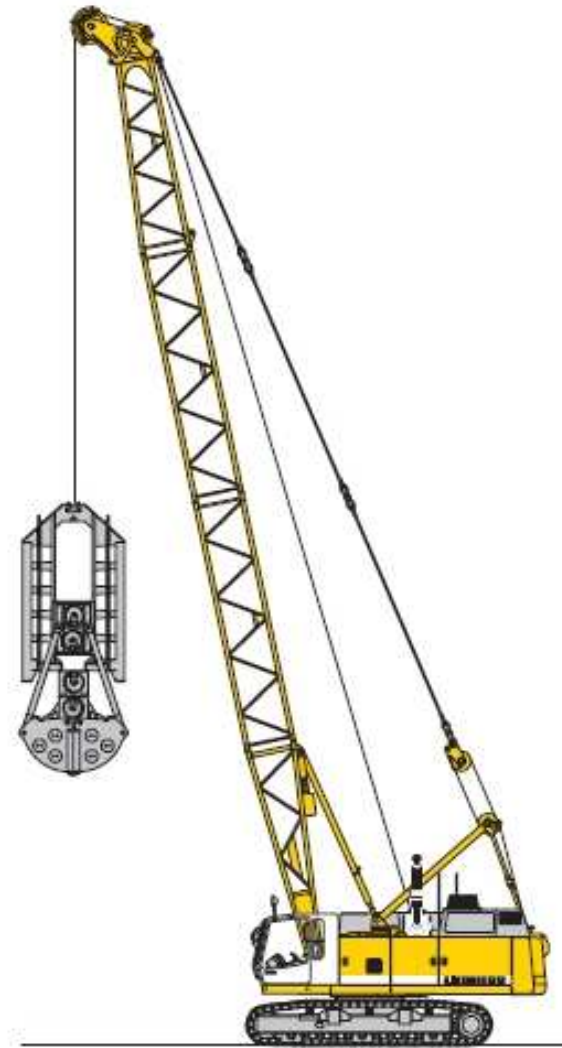


Crawler Cranes *Lánctalpas mobildaruk*

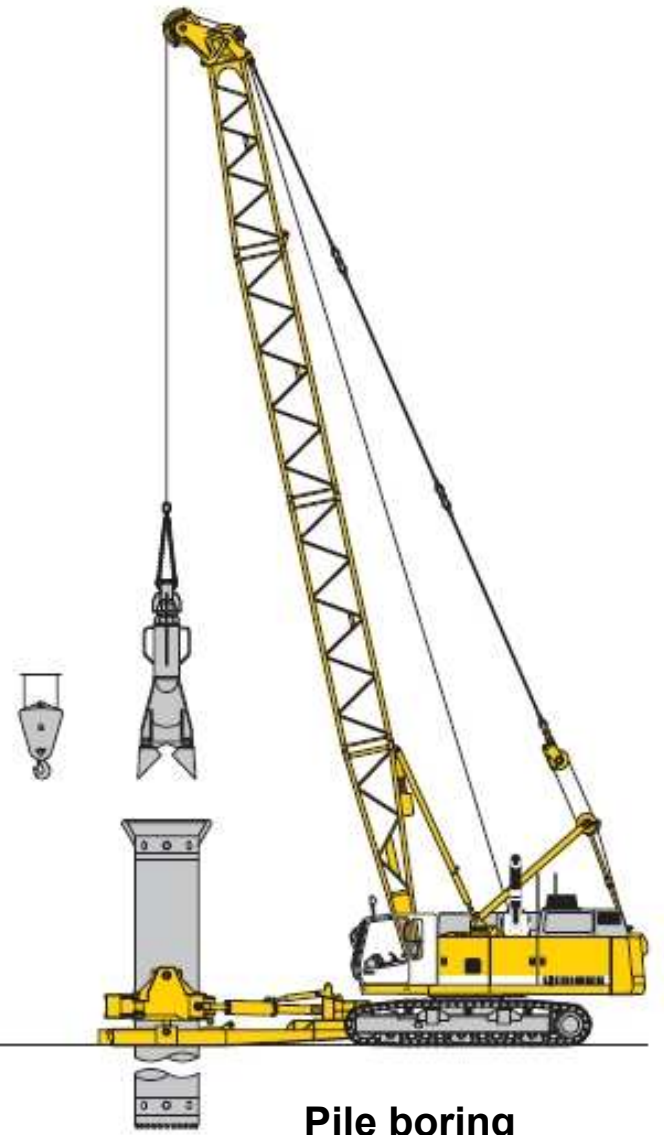
Typical at deep foundation works *Jellemző a mélyalapozási munkáknál*



Drilling
Sziklafúró

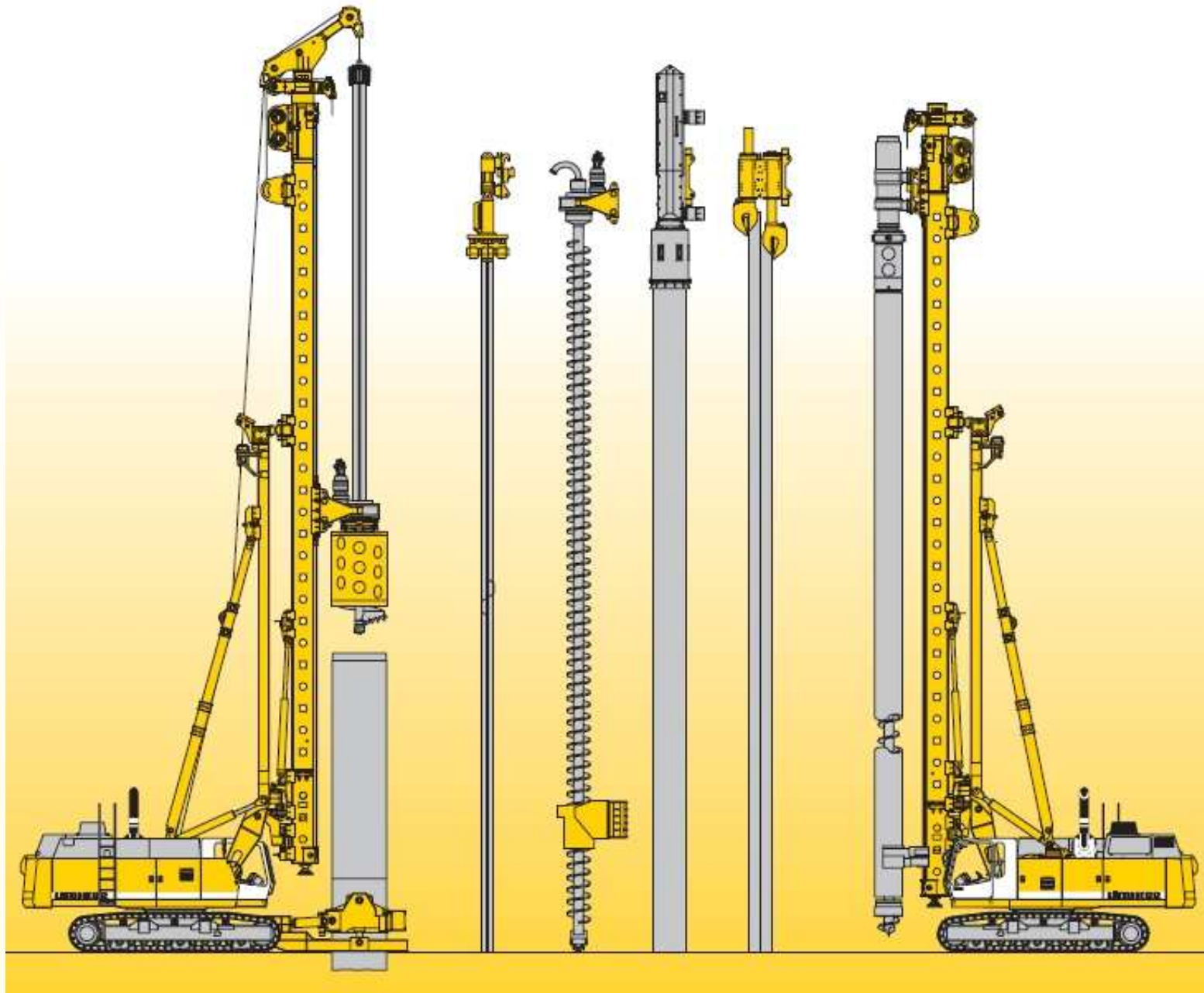


Slurry-wall excavation
Résfal markoló

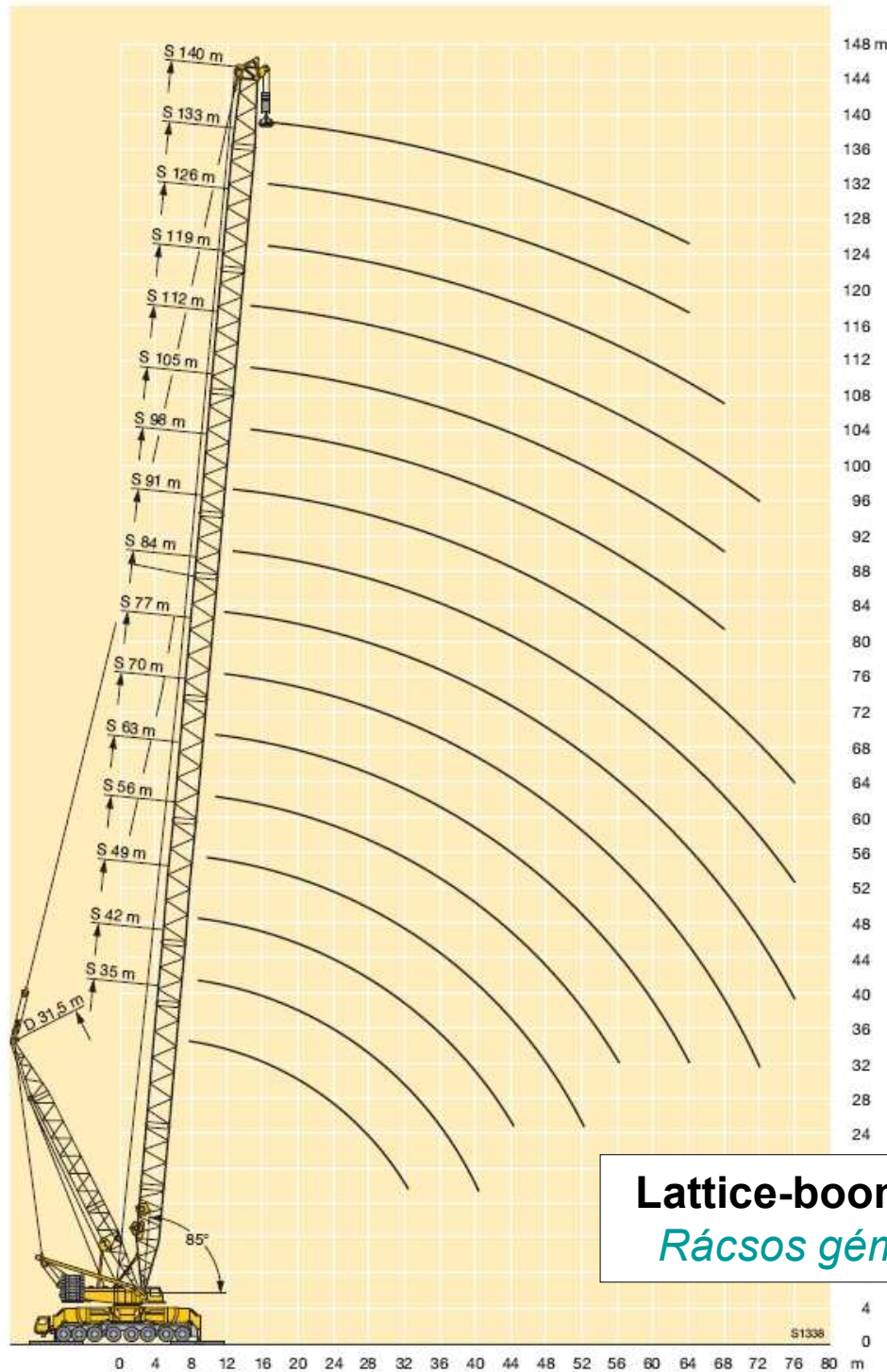


Pile boring
Cölöpfúró

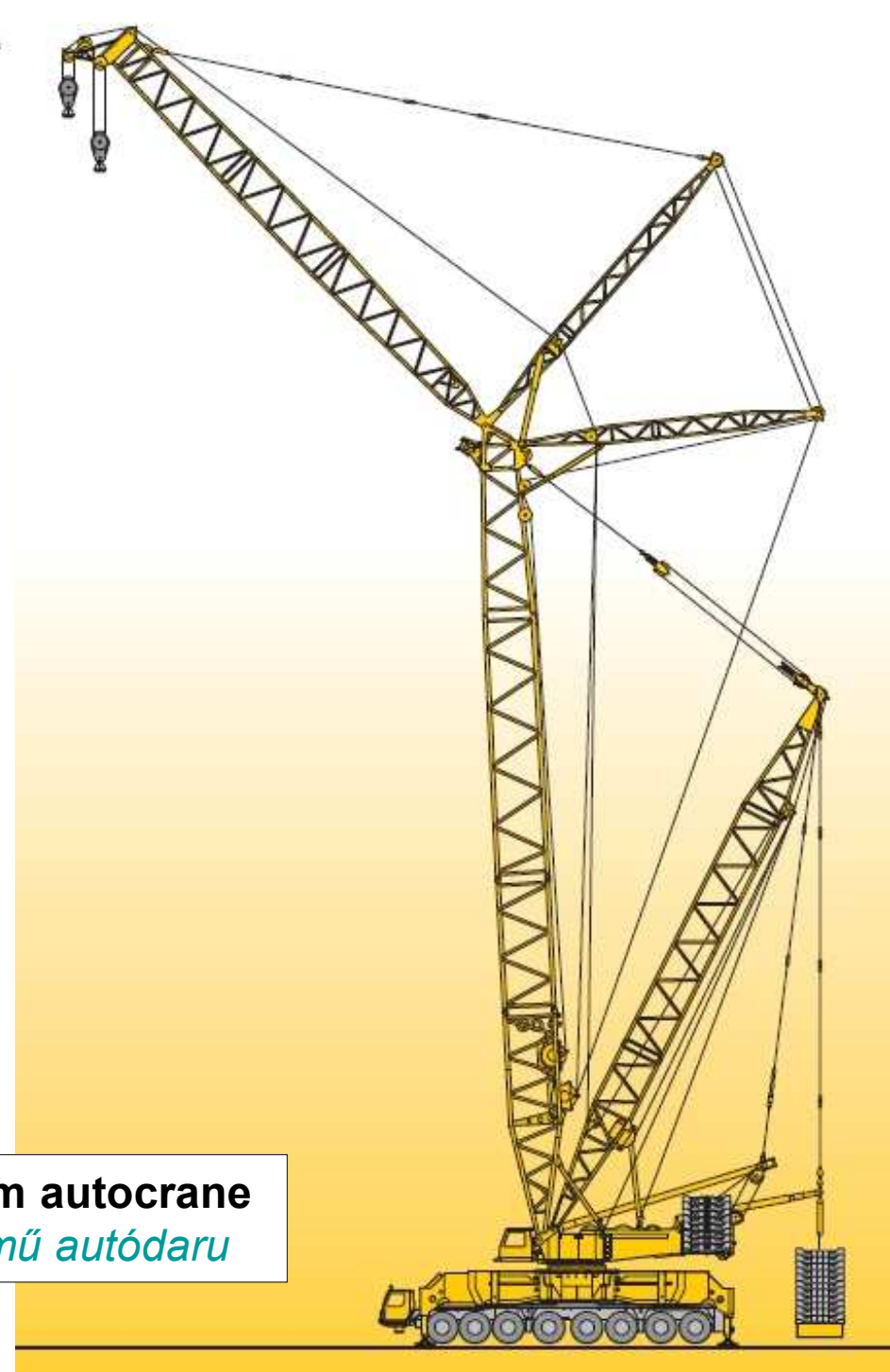
Crawler Cranes *Lánctalpas mobildaruk*



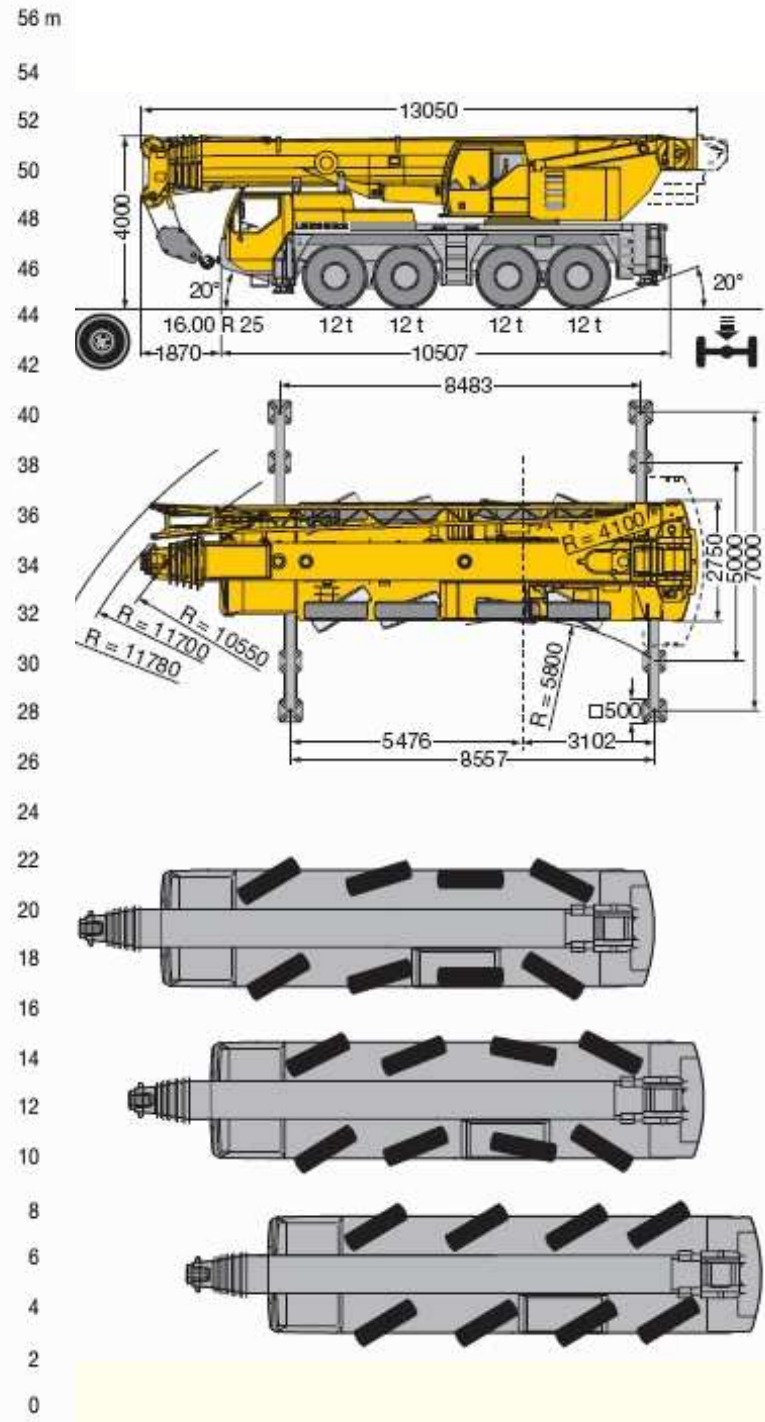
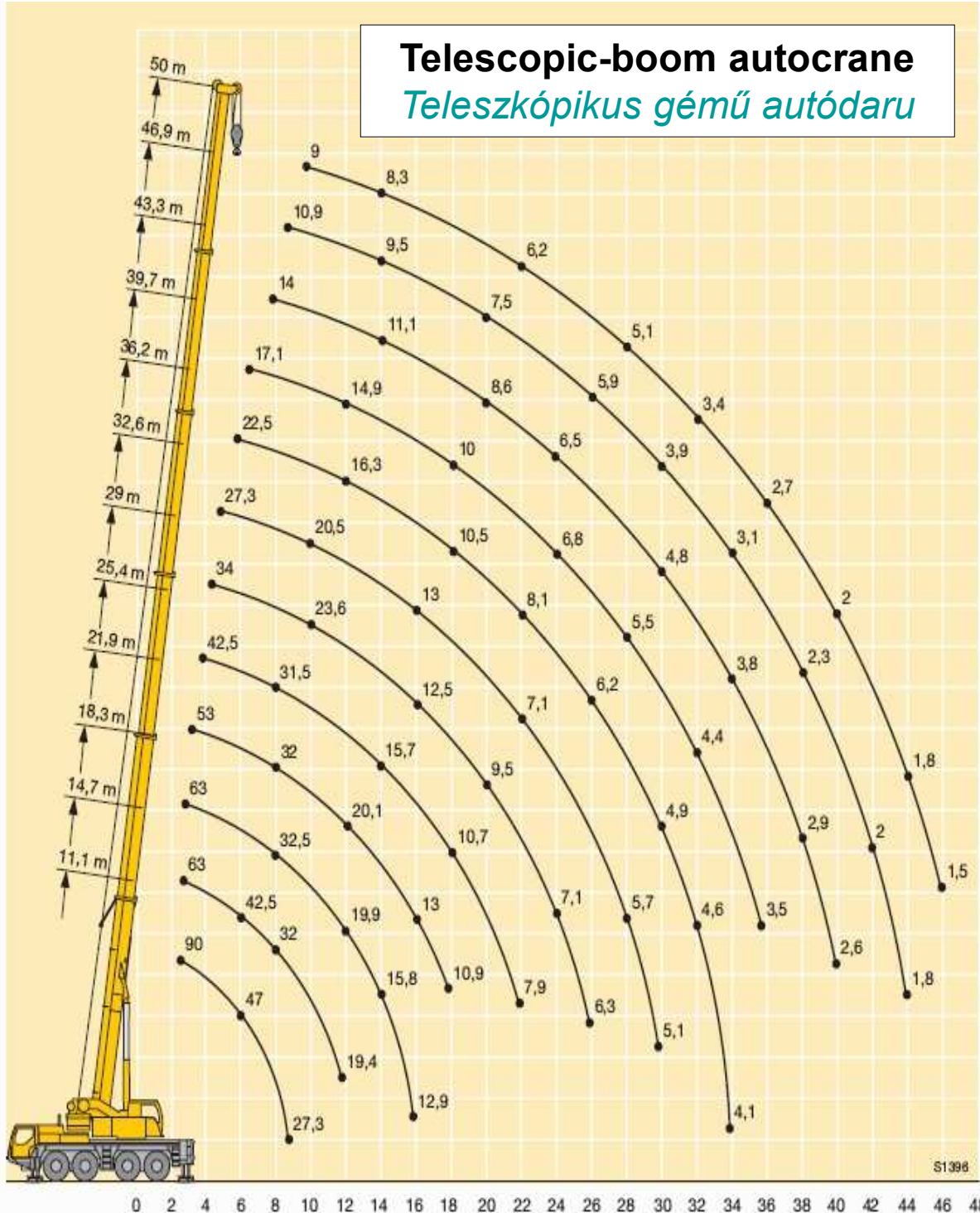
Deep inside below (deep foundations, explorations) *Nagymélységű munkák (mélyalapozás, feltárás)*

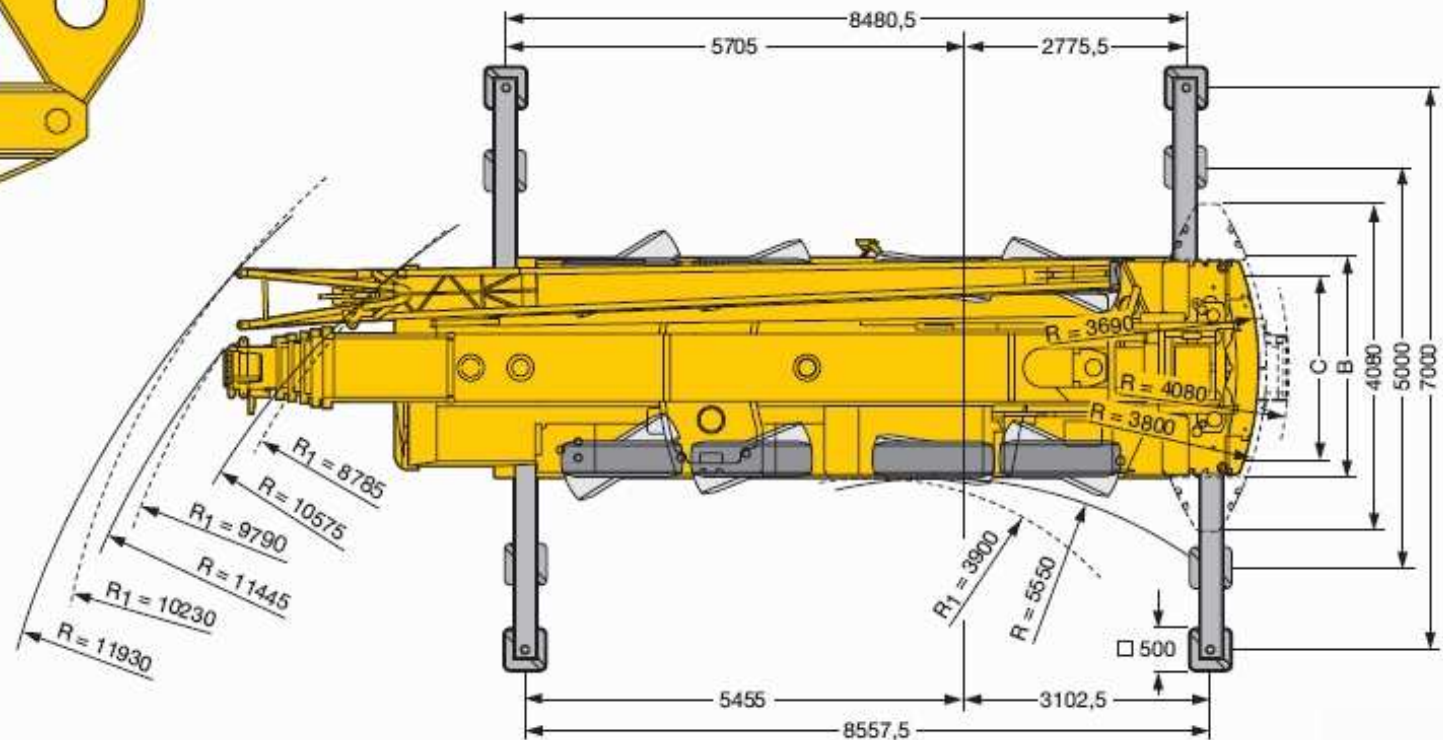
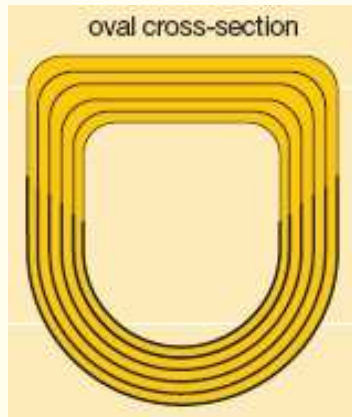
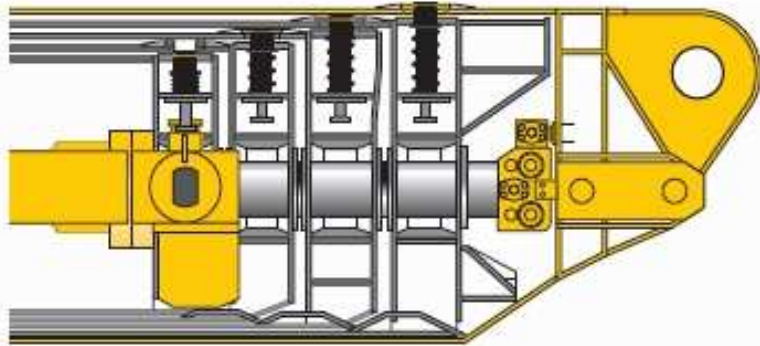
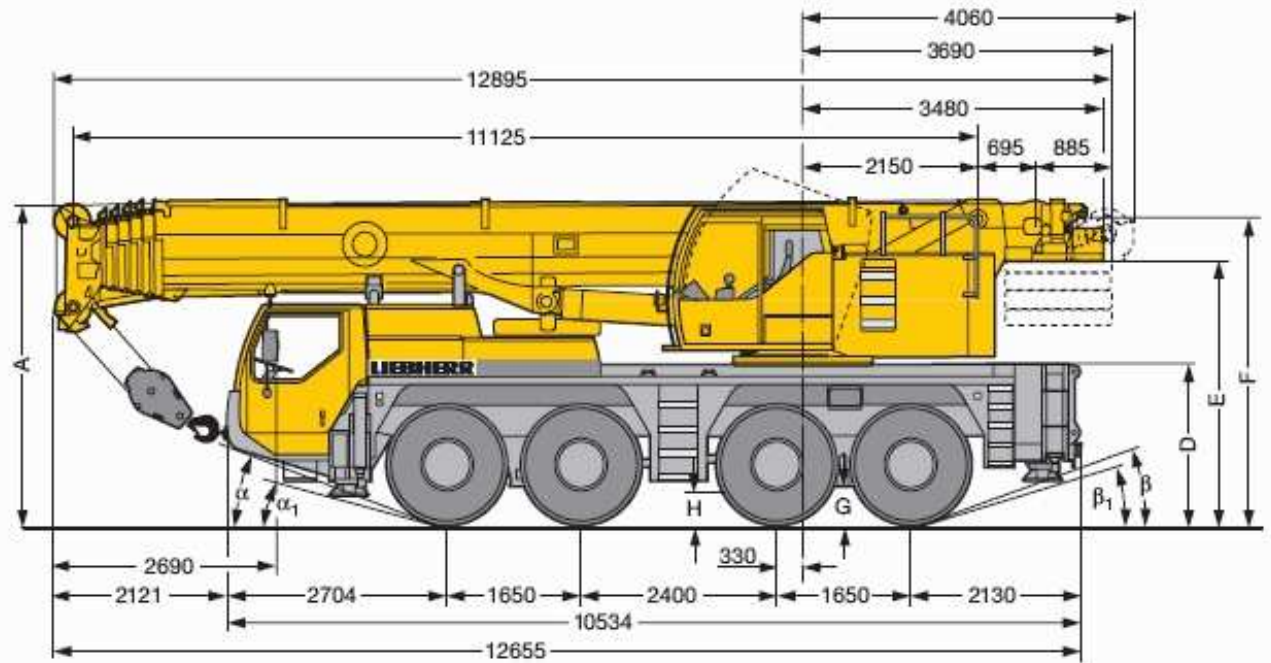
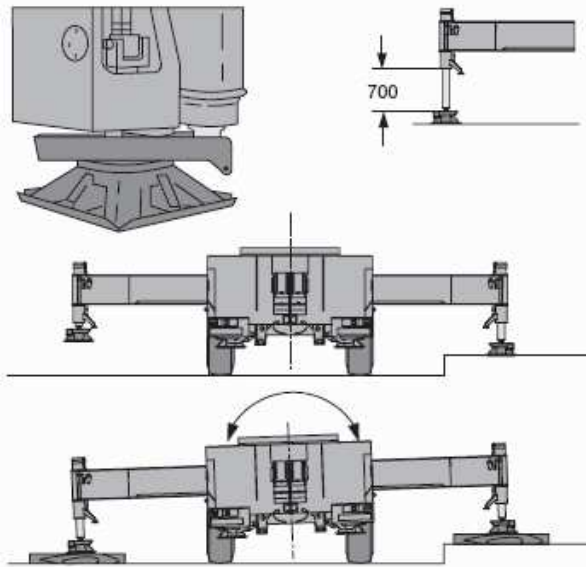


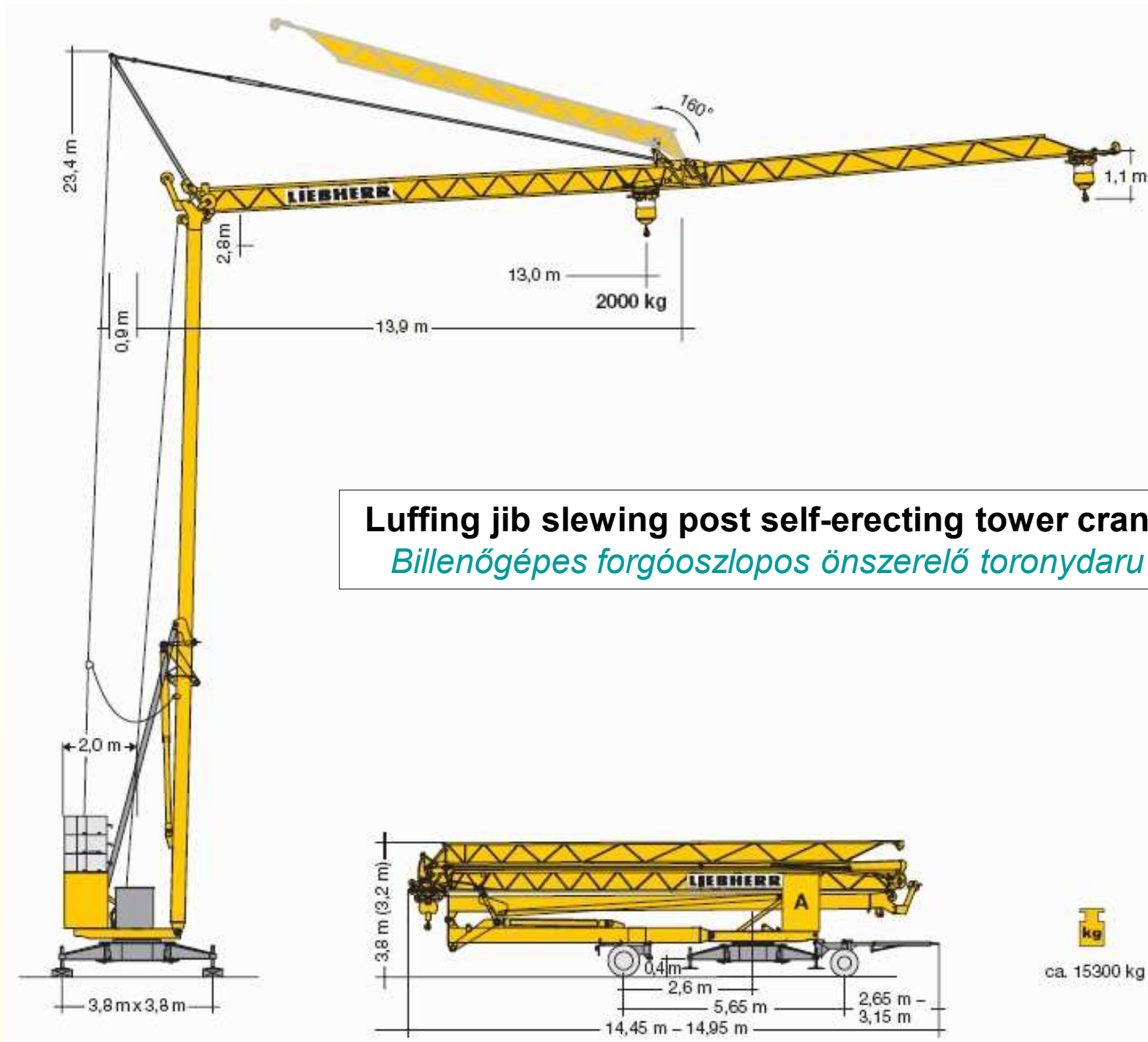
Lattice-boom autocrane
Rácsos gémű autódaru



Telescopic-boom autocrane *Teleszkópikus gémmű autódaru*



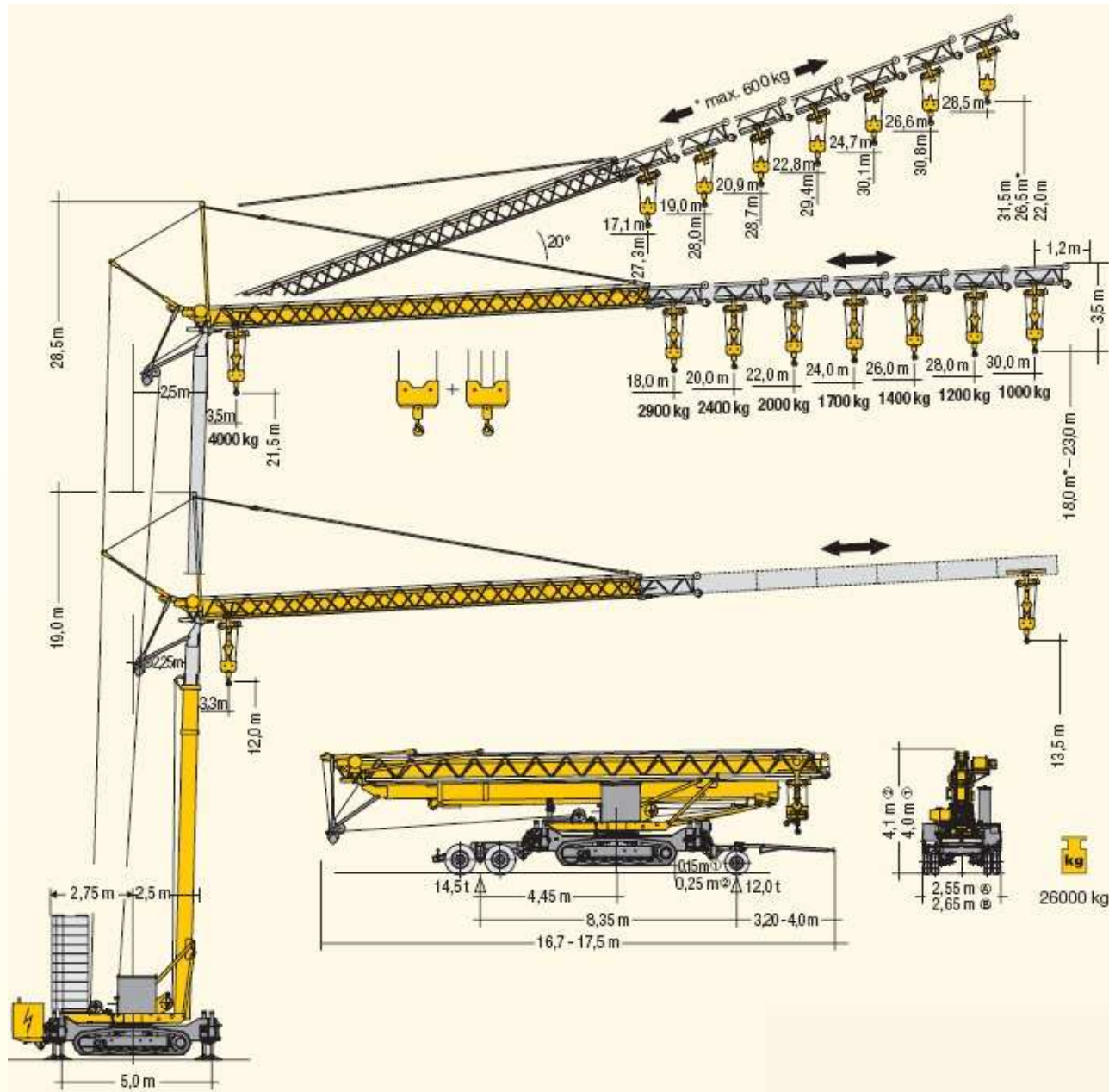




Luffing jib slewing post self-erecting tower crane
Billenőgépes forgóoszlopos önszerelő toronydaru

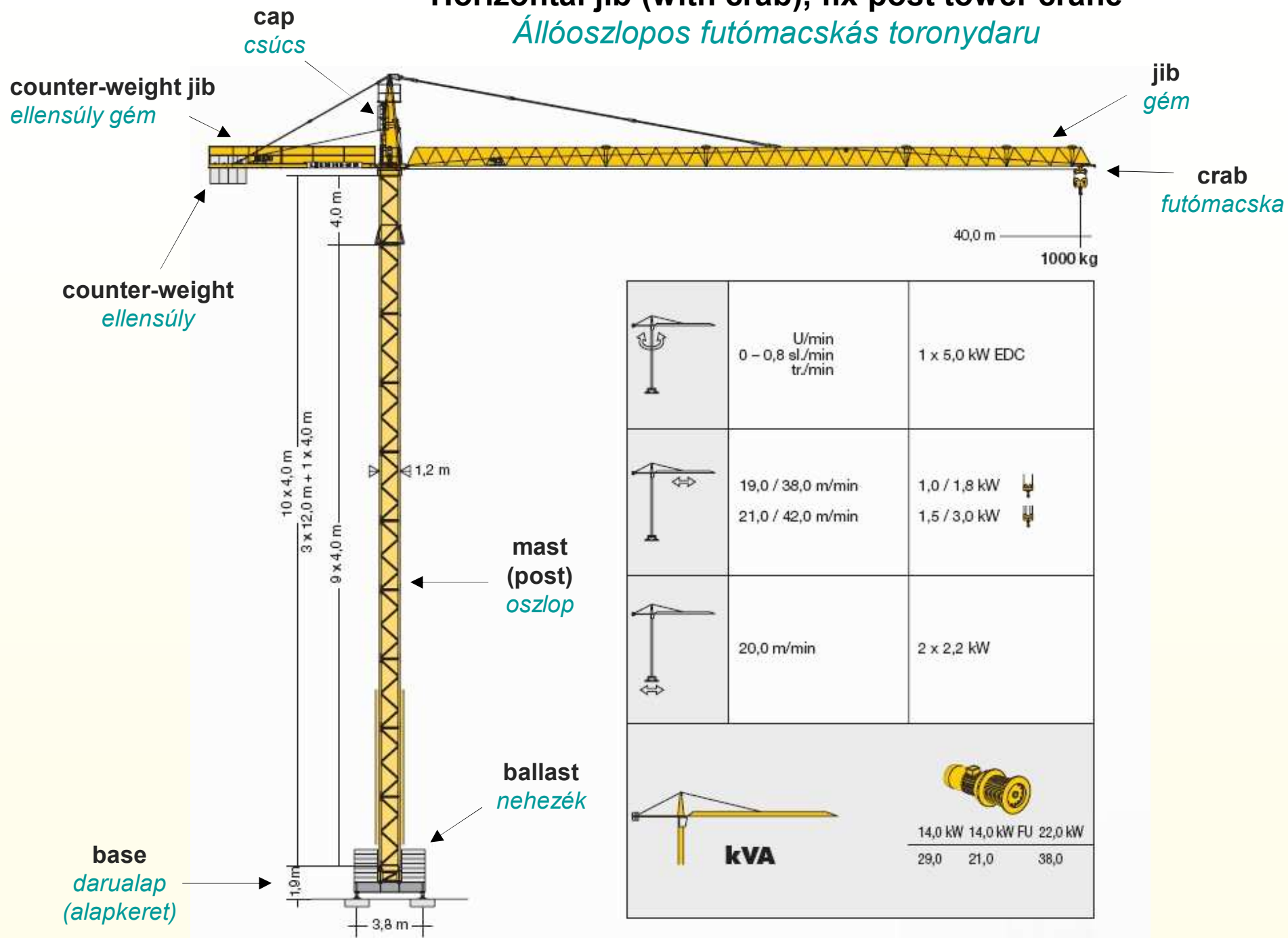
Luffing jib with crab, slewing post track mounted self-erecting tower crane

Billenőgémes futómacskás forgóoszlopos lánctalpas önszerelő toronydaru

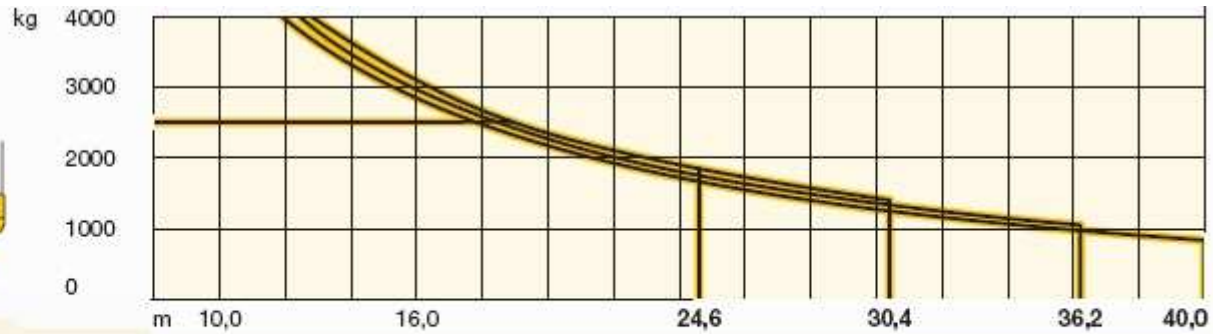
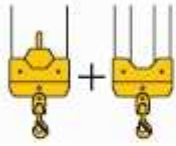


Travelling in folded position (towed as a trailer) *Szállítás összehajtott állapotban (utánfutóként)*

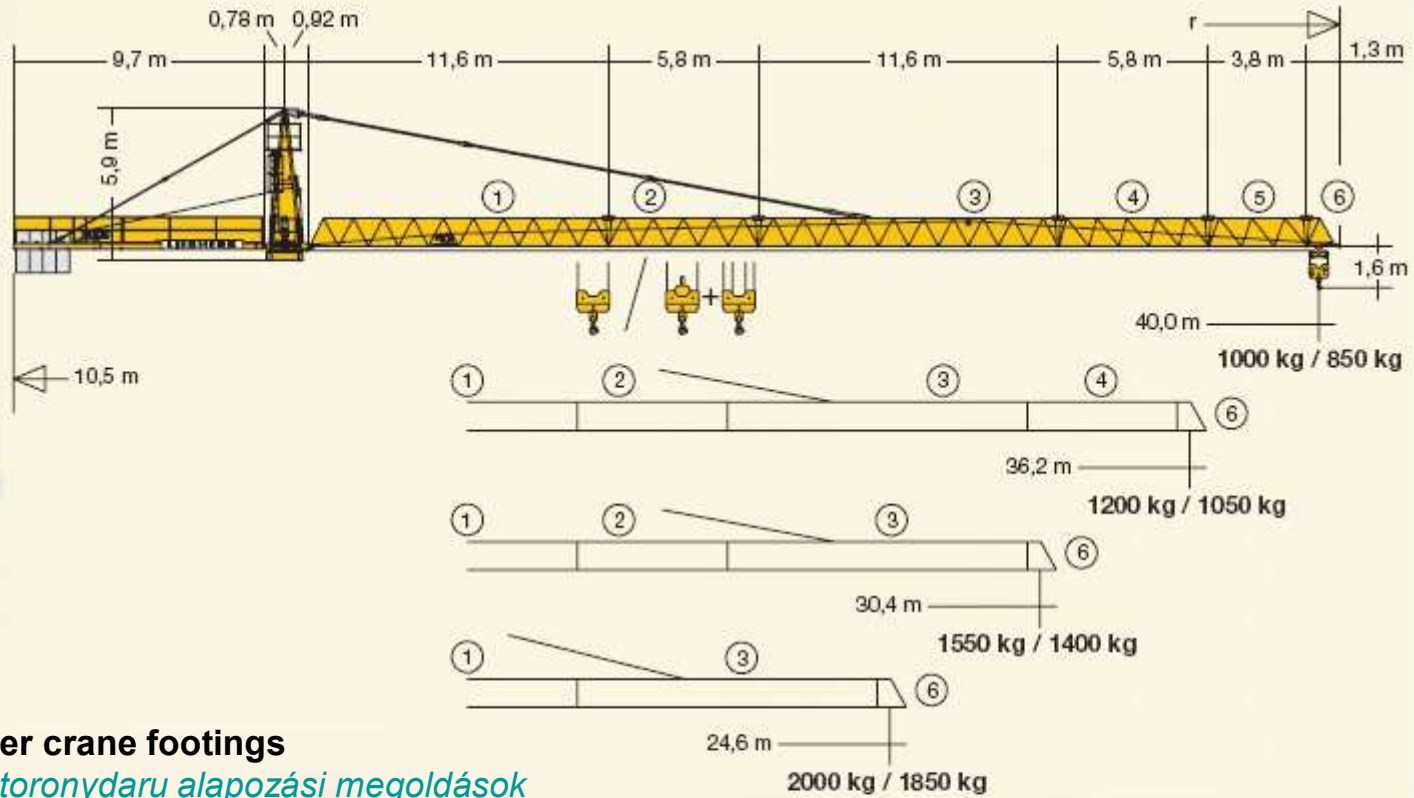
Horizontal jib (with crab), fix post tower crane Állóoszlopos futómacskás toronydaru



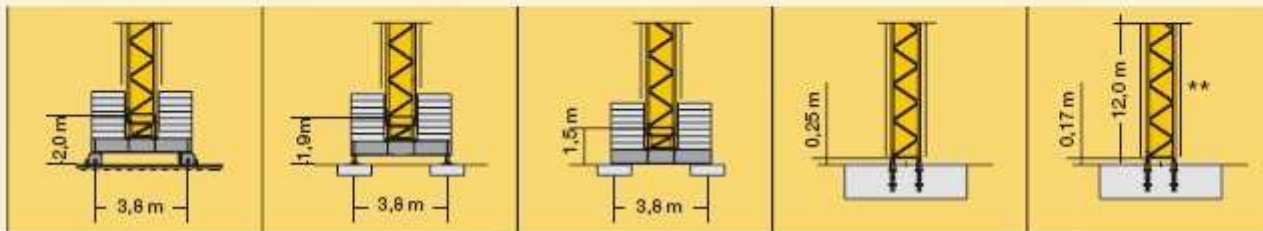
**Hook casing,
sheave block**
*Horogház,
csigablokk*

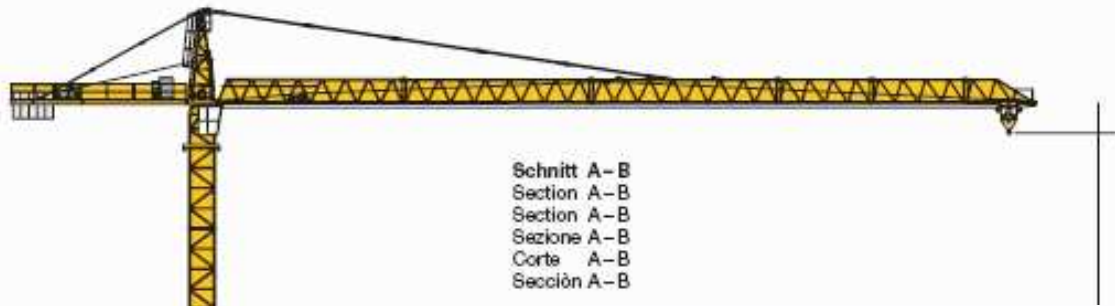


**Jib length
(handling radius)
and lifting capacity**
*Gémhossz
(karolási távolság)
és emelőkéesség*



Fix-post tower crane footings
Állóoszlopos toronydaru alapozási megoldások





Schnitt A-B
Section A-B
Section A-B
Sezione A-B
Corte A-B
Sección A-B

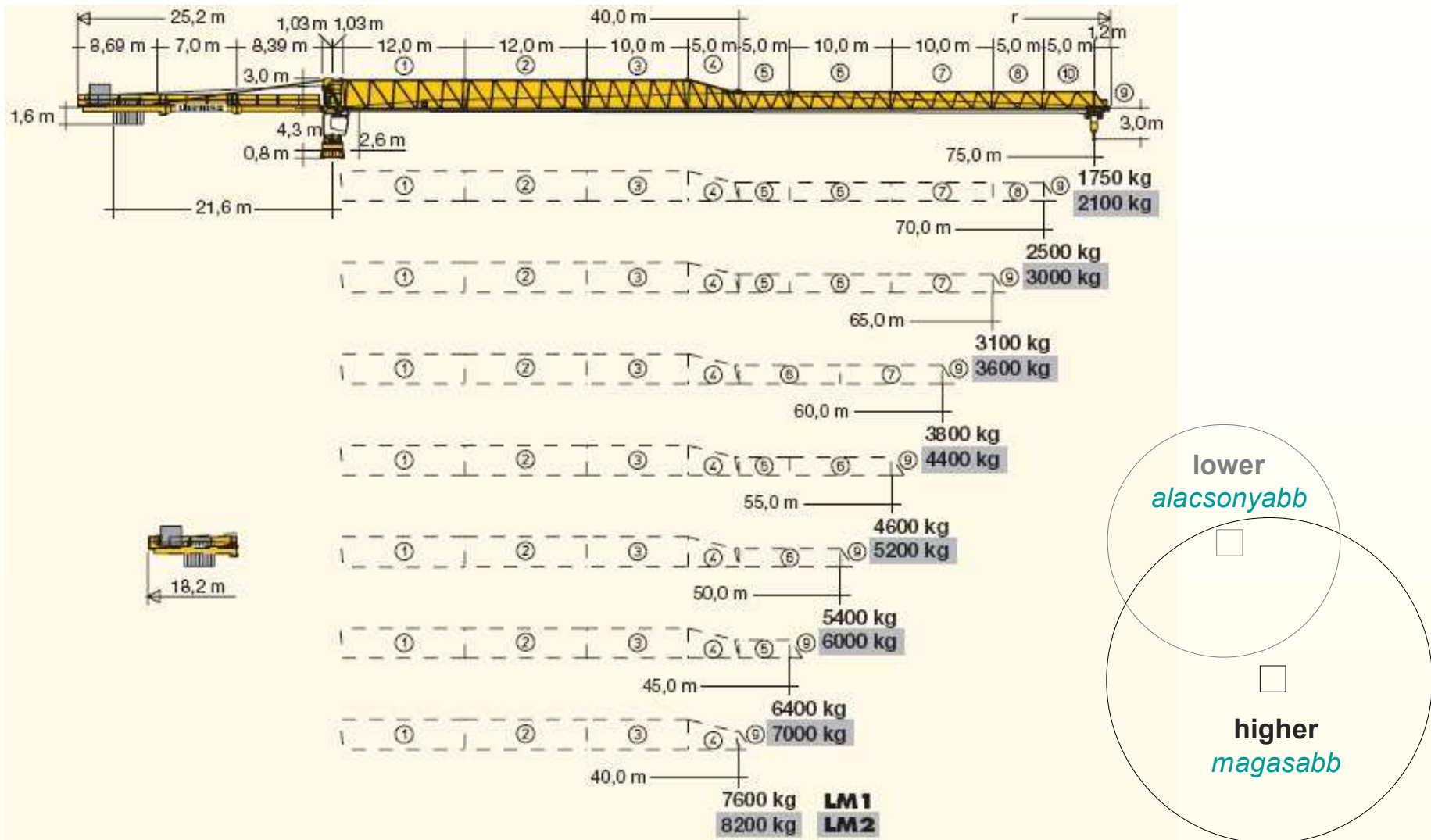
Climbing crane *Kúszódaru*

		256 IC							
n	Ausleger / Jib / Flèche / Braccio / Pluma / Lança	30,0 m	35,0/40,0 m 45,0 m	50,0/55,0 m	Ausleger / Jib / Flèche / Braccio / Pluma / Lança	30,0 m	35,0/40,0 m 45,0 m	50,0/55,0 m	
8	52,6 ¹⁾	-	-	-	nx5,8m	7 ¹⁾	-	-	
7	46,8 ¹⁾	46,8 ¹⁾	-	6 ¹⁾		-	-		
6	41,0 ¹⁾	41,0 ¹⁾	41,0 ¹⁾	5 ¹⁾		5 ¹⁾	5 ¹⁾		
5	35,2 ¹⁾	35,2 ¹⁾	35,2 ¹⁾	4 ¹⁾		4 ¹⁾	4 ¹⁾		

		256 HC							
n	Ausleger / Jib / Flèche / Braccio / Pluma / Lança	30,0/35,0 m	40,0/45,0 m 50,0 m	55,0 m	Ausleger / Jib / Flèche / Braccio / Pluma / Lança	30,0/35,0 m	40,0/45,0 m	50,0 m	55,0 m
8	38,7 ¹⁾	-	-	-	nx4,14m	6 ¹⁾	-	-	-
7	34,6 ¹⁾	34,6 ¹⁾	-	5 ¹⁾		5 ²⁾	-	-	
6	30,5 ¹⁾	30,5 ¹⁾	30,5 ¹⁾	4 ¹⁾		4 ¹⁾	4 ¹⁾		

Fix-post (mast) tower crane *Állóoszlopos toronydaru*

Flat-top (with no cap), horizontal slewing jib (with crab) fix-post tower crane „Flat-top” (csúcs nélküli) vízszintes gémű (futómacskás) állóoszlopos toronydaru

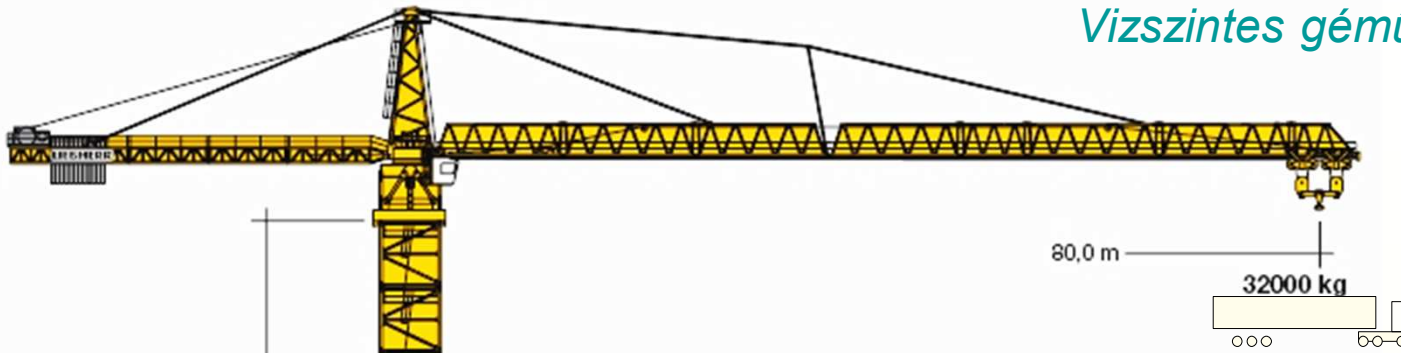


Typical where more tower cranes have to co-operate within reach
 (as the lower crane; the higher can mount and dismount the lower one)

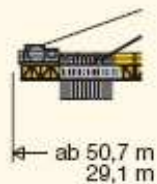
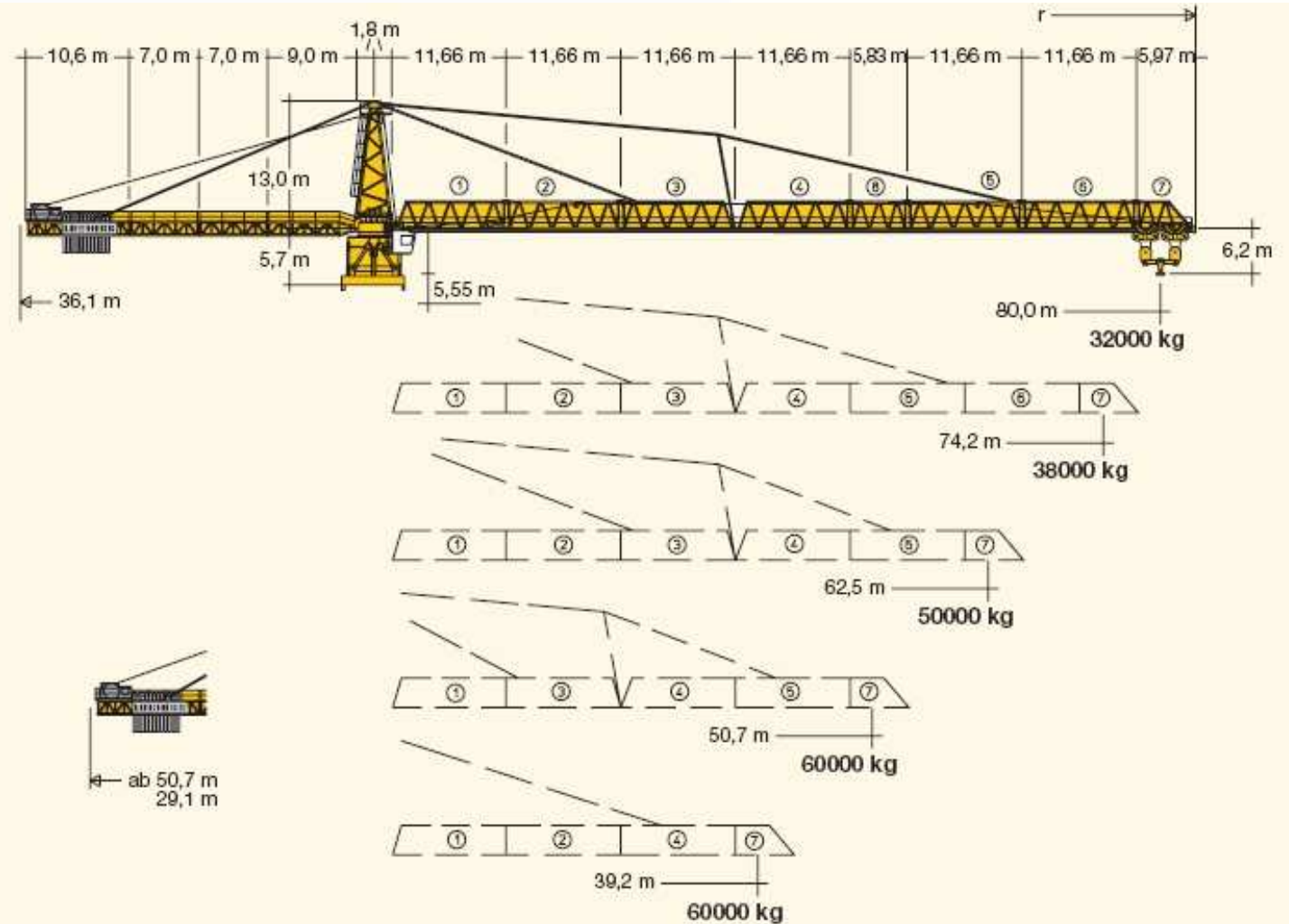
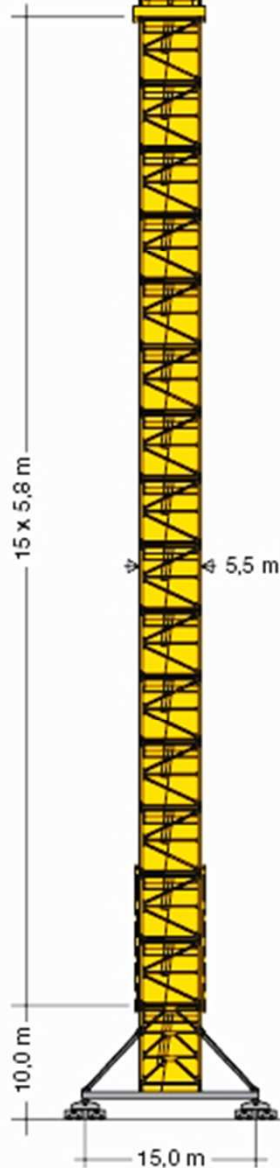
Tipikus ahol több toronydaru karoláson belül kell, hogy öszedolgozzék
 (mint alacsonyabb daru; a magasabb daru segíthet az alacsonyabb felállításában és bontásában)

Horizontal slewing jib fix post tower crane

Vízszintes gémű állóoszlopos toronydaru



Not the smallest one
(Consider its sizes!)
„Nem épp a legkisebb”
(Figyelje a méreteket!)



The compact tower head. EC-B Flat-Top tower cranes.

New technology. New ideas.

Complete unit including:

Cabin, slewing gears, switchgear, slewing ring support, slewing ring, guy frame and current collector

Retractable deluxe cabin

Folding guy frame

Compact tower head.

- Transport in upright position possible
- Completely pre-assembled
- A single transport unit
- Erection in a single lift
- Plug-in connections for the entire electrical installation
- Slewing possible immediately after erection
- Only one switch cabinet including S1 and S2
- Folding guy frame for low transport height
- Interchangeable deluxe cabin
 - can be removed
 - can be retracted for transport



LIEBHERR

Basic Standard Hand Signals for Cranes and Hoisting Equipment



HOIST: With forearm vertical, and forefinger pointing up, move hand in small horizontal circle.



LOWER: With arm extended downward, forefinger pointing down, move hand in a small horizontal circle.



RAISE BOOM: Arm extended, fingers closed, thumb pointing upward.



LOWER BOOM: Arm extended, fingers closed, thumb pointing downward.



EXTEND BOOM: Both fists in front of body with thumbs pointing outward.



RETRACT BOOM: Both fists in front of body with thumbs pointing toward each other.



SWING: Arm extended, point with finger in direction of desired boom swing.



STOP DOG EVERYTHING: Clasp hands in front of body.



MOVE SLOWLY: Use one hand to give any motion signal and place the other hand motionless in front of the hand giving the signal.



TRAVEL: Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



USE MAIN HOIST: Tap fist on head; then use regular signals.



USE WHIP LINE (AUXILIARY HOIST): Tap elbow with one hand; then use regular signals.



STOP: Arm extended, palm down, move arm back and forth horizontally.



RAISE THE BOOM AND LOWER THE LOAD: With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



LOWER THE BOOM AND RAISE THE LOAD: With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.



EMERGENCY STOP: Both arms extended, palms down, move arms back and forth horizontally.

[Basic Standard Hand Signals](#) (PDF file).

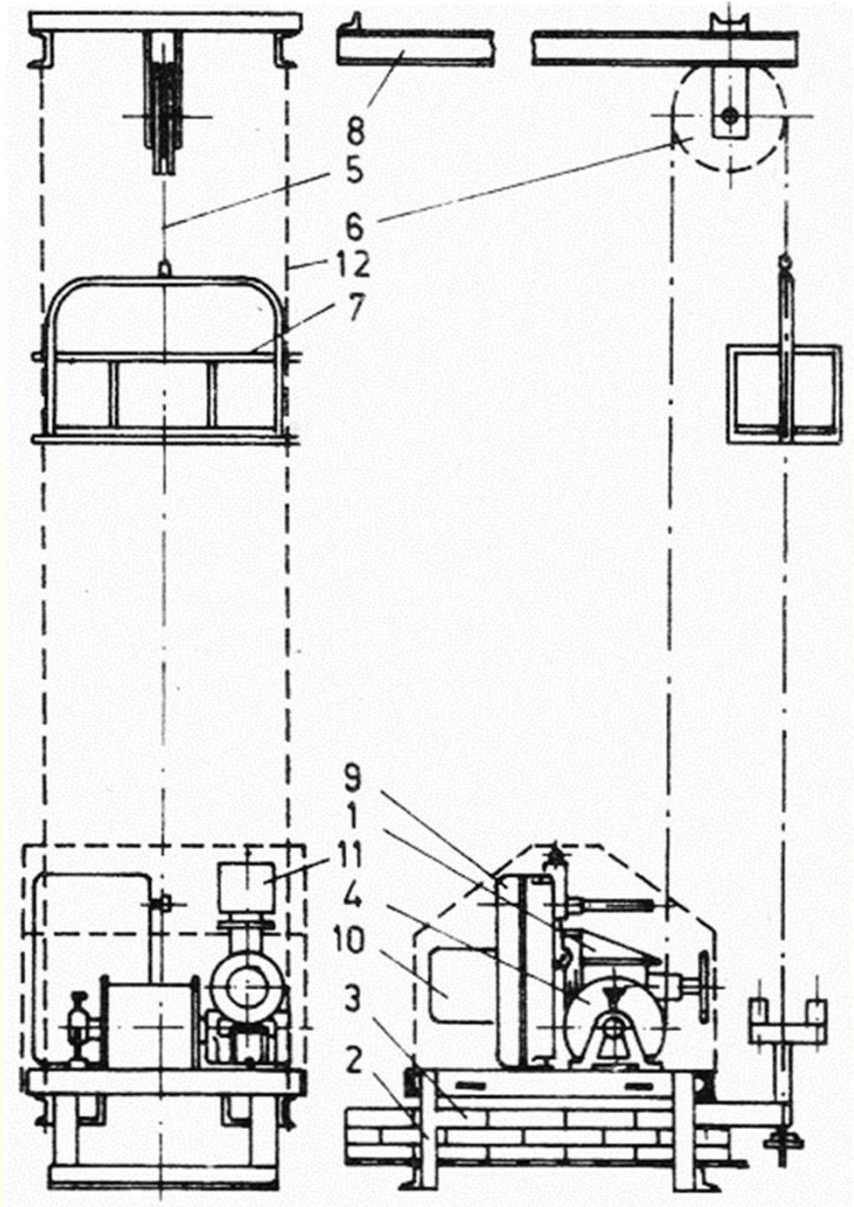
Issued: 04/08/2003
Tag #: AP2003-M061



Exterior (Contractor's) Hoists

Külső (építési) felvonók

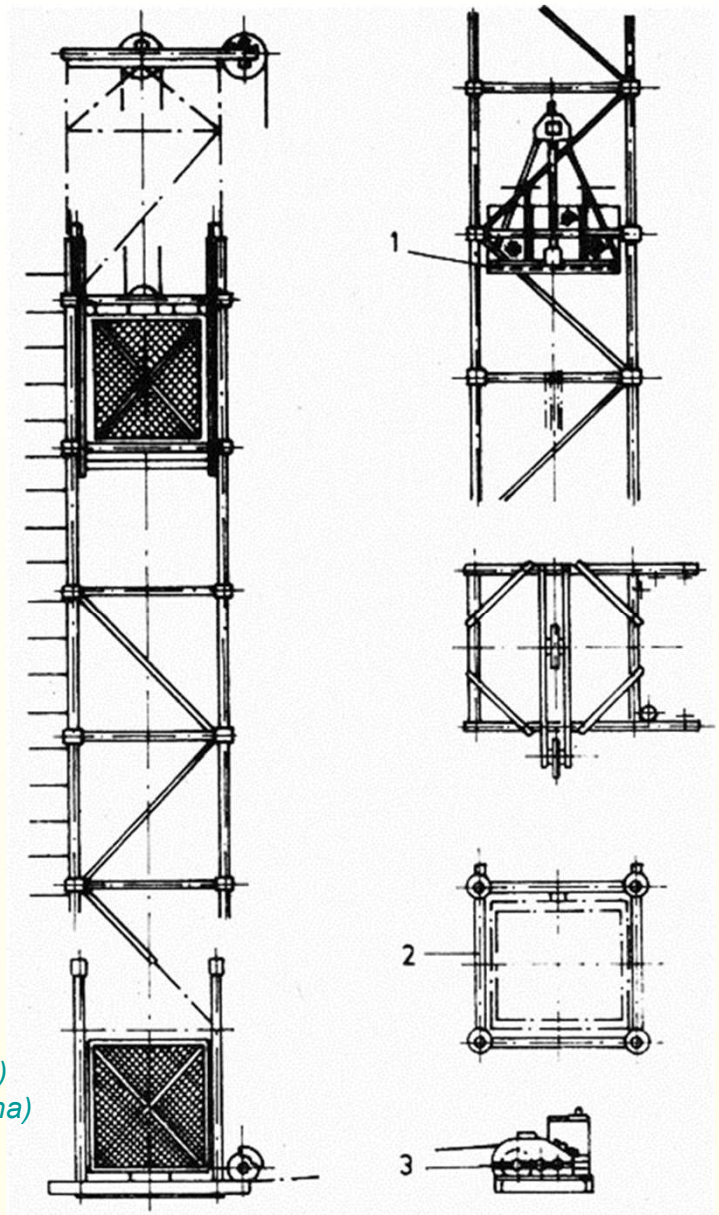
Cage lift
(vázszerkezet nélküli felvonó)
 „Vitla”



1. gear *hajtómű*
2. base *alapperet*
3. counter-weight *ellensúly*
4. cable drum *kötéldob*
5. flying wire *emelőkötél*
6. guide wheel *vezetőkerék*
7. cage *emelőkosár*
8. guide rail *vezetősín*
9. control box *vezérlő-szekrény a végkapcsolóval*
10. electromotor *elektromos meghajtású motor*
11. break *fékszerkezet*
12. guide rope *vezetőkötél*

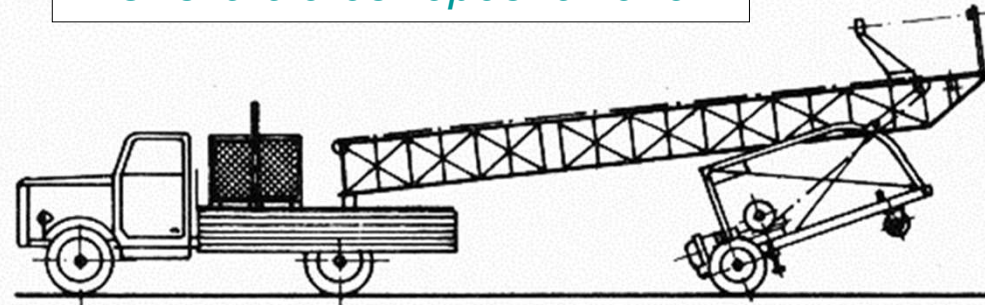
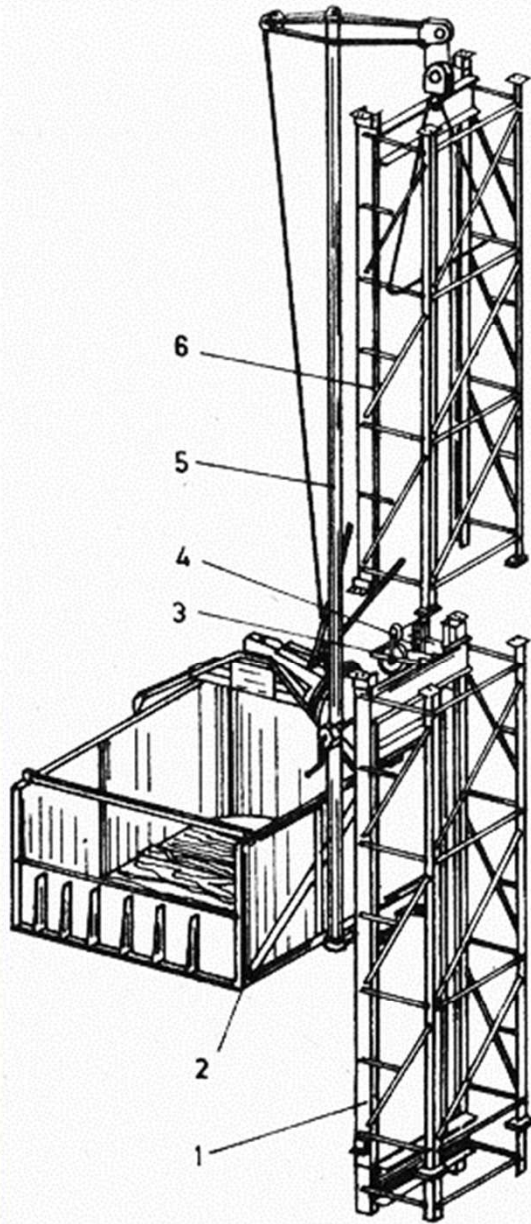
1. cage *emelőkosár (fülke)*
2. shaft *vázszerkezet (akna)*
3. winch *csörlő*

Shaft lift
Aknás felvonó

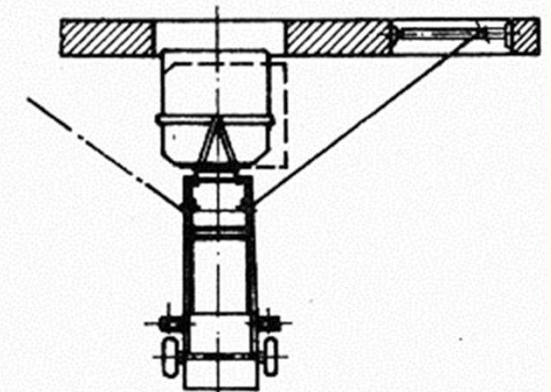
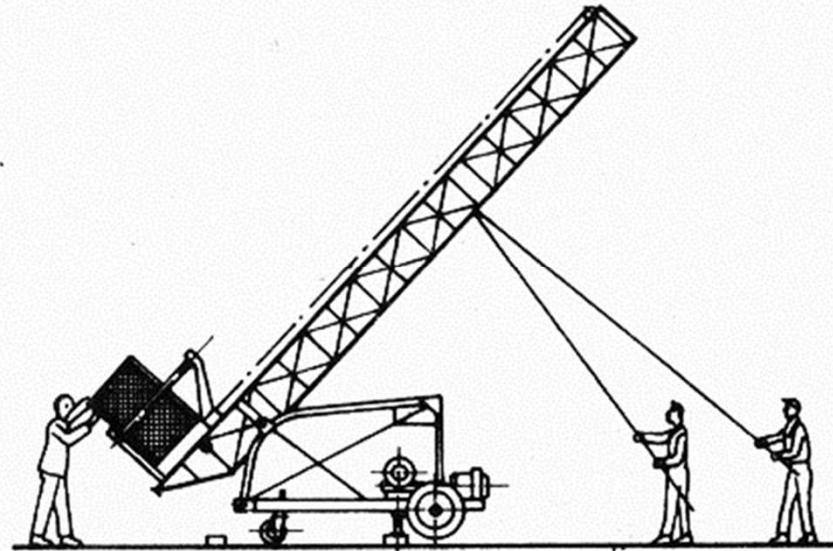


Elevator Tower Hoist

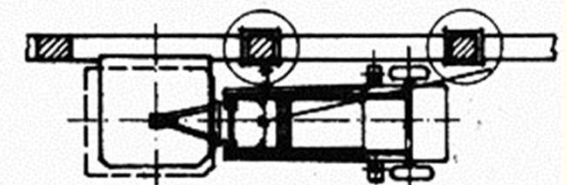
Önszerelő oszlopos felvonó



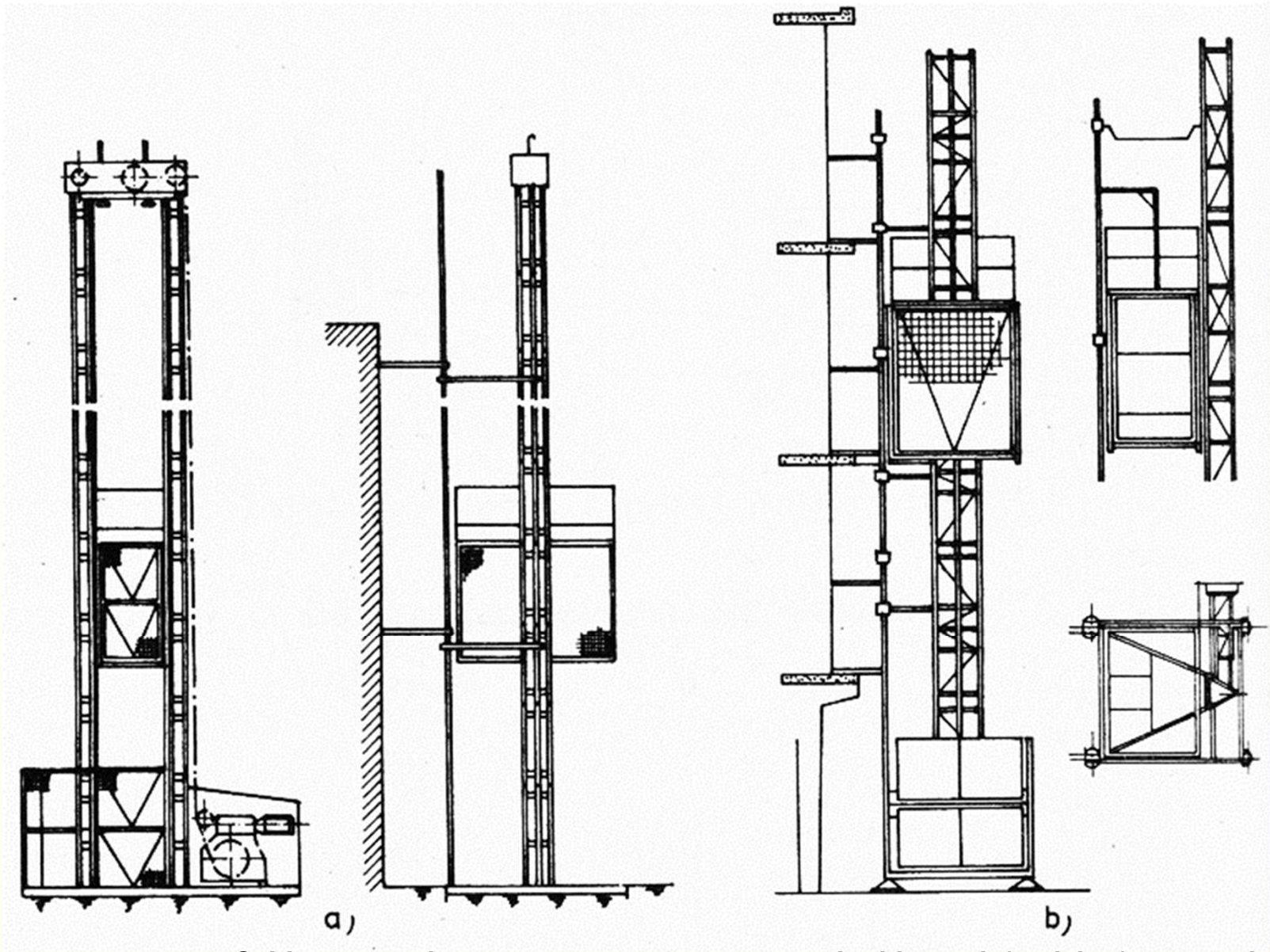
Transporting and erecting
Szállítás és összeszerelés



- 1. guide rail *vezetősin*
- 2. cage *emelőkosár*
- 3. idler *görgő*
- 4. suspension *felfüggesztő szerkezet*
- 5. assembly crane *szelődaru*
- 6. tower *oszlop*

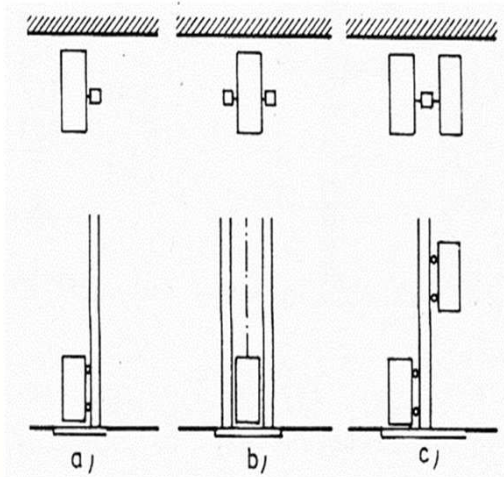


Freight- and Passenger Lifts (Elevators/Hoists)
Építési teher- és személyfelvonók

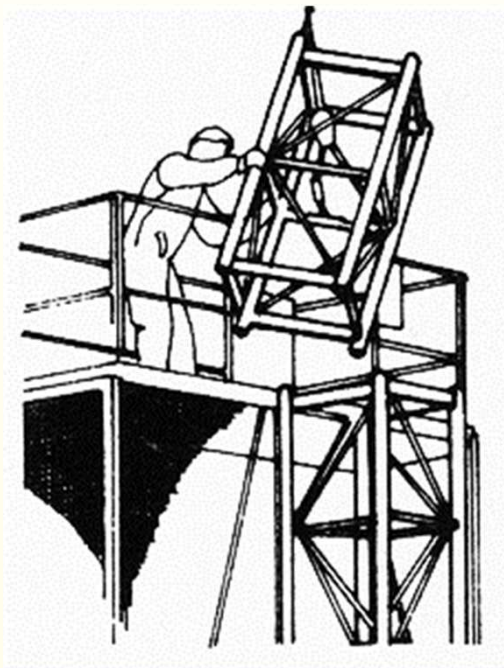


Cable operated
Emelőköteles

Ladder rack (rack bar) operated
Fogasléces

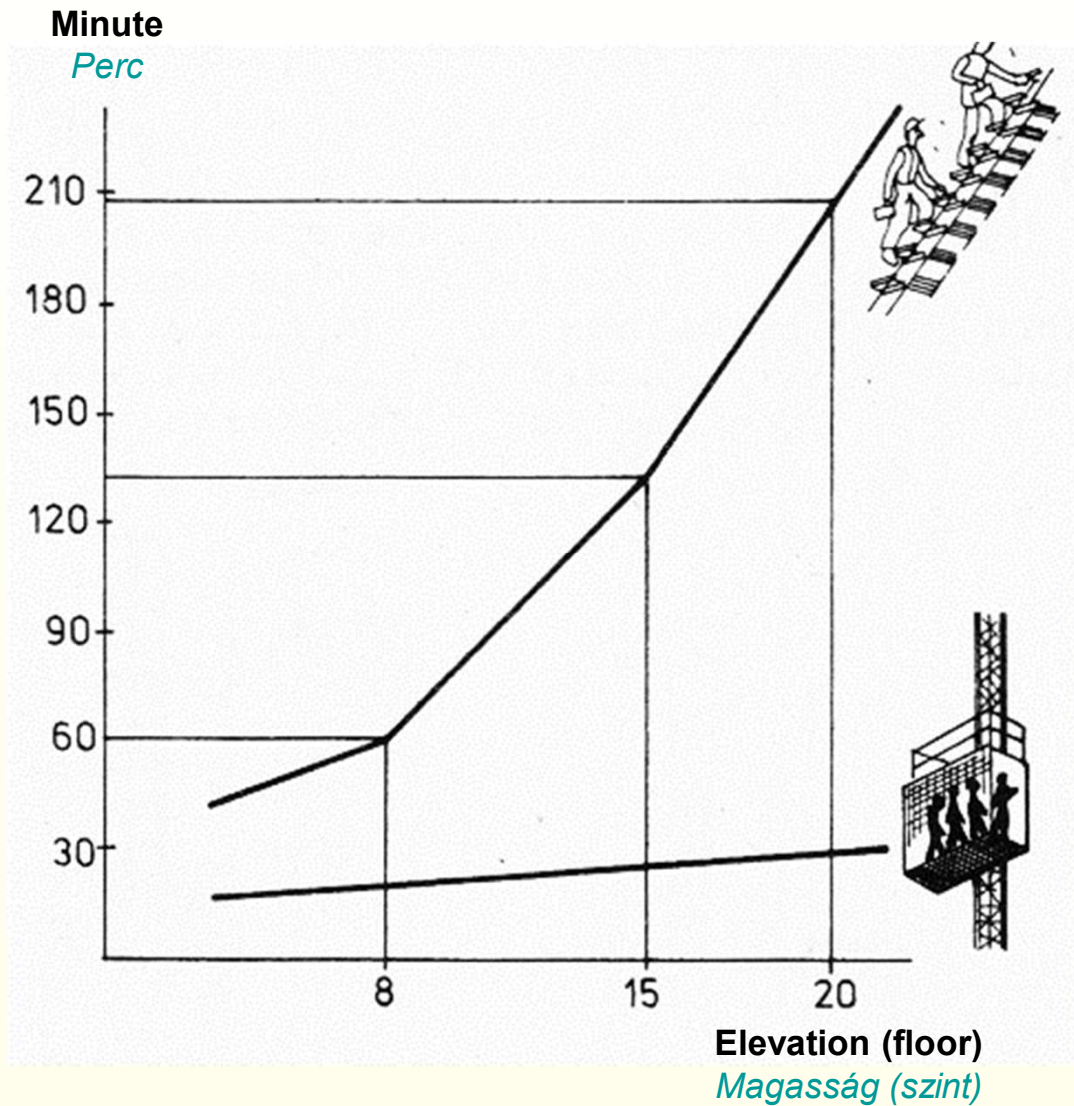


- a. single mast *egyszlopos*
- b. twinmast *kétszlopos*
- c. single mast two cages *egyszlopos kétszokrényes*

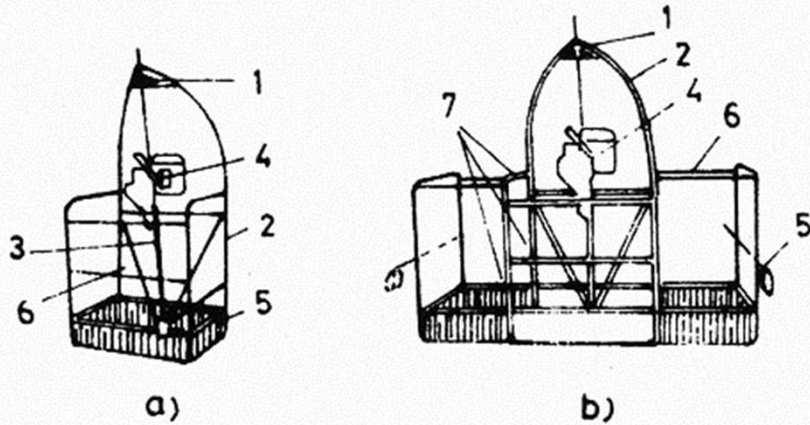


Extending the lift tower
Felvonóoszlop toldása

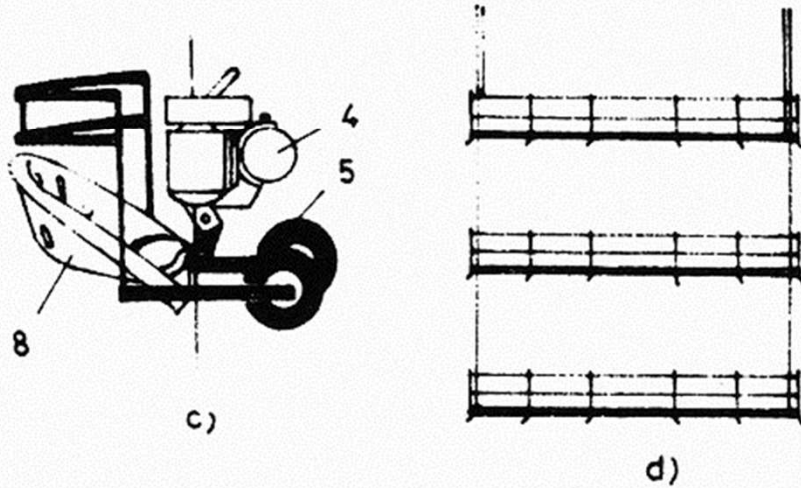
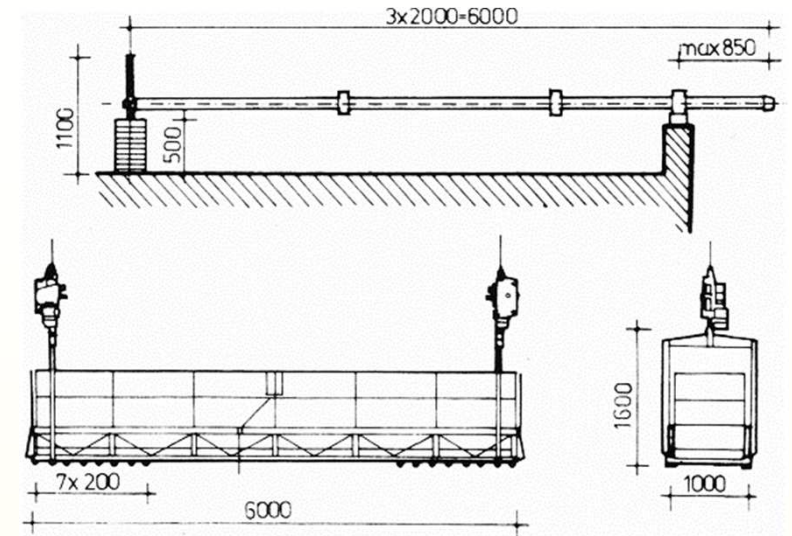
Time-consumption of on-site vertical traffic
Építéshelyszíni függőleges irányú közlekedés időigénye



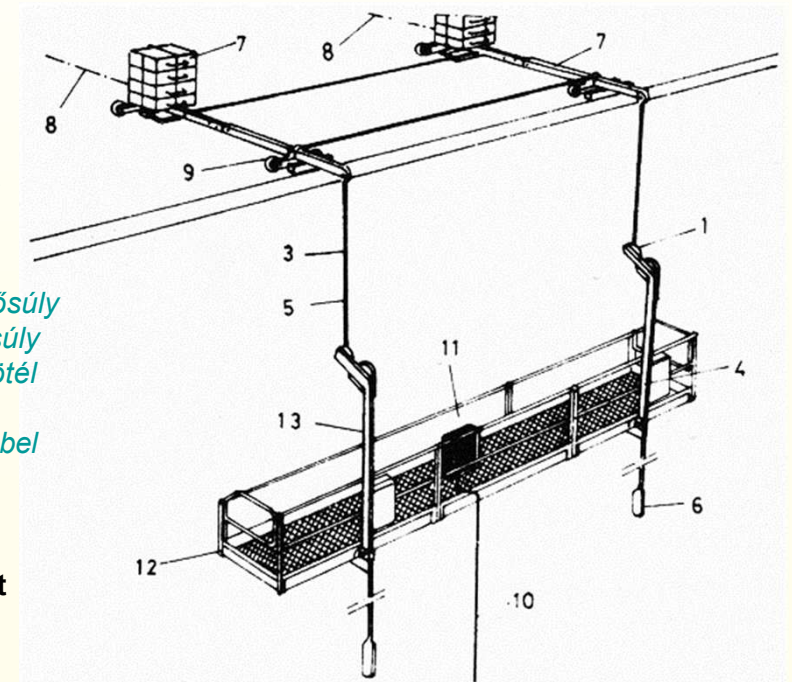
Suspended scaffolds *Függőállványok*



1. guide sheave *vezetőtárcsa*
2. cage frame *kas keret*
3. frame post *vázoszlop*
4. climbing unit *kúszó egység*
5. guide wheels *vezetőkerekek*
6. auxiliary platform *kas / munkaállás*
7. shackle pin *kengyelcsavar*
8. seat *ülés*

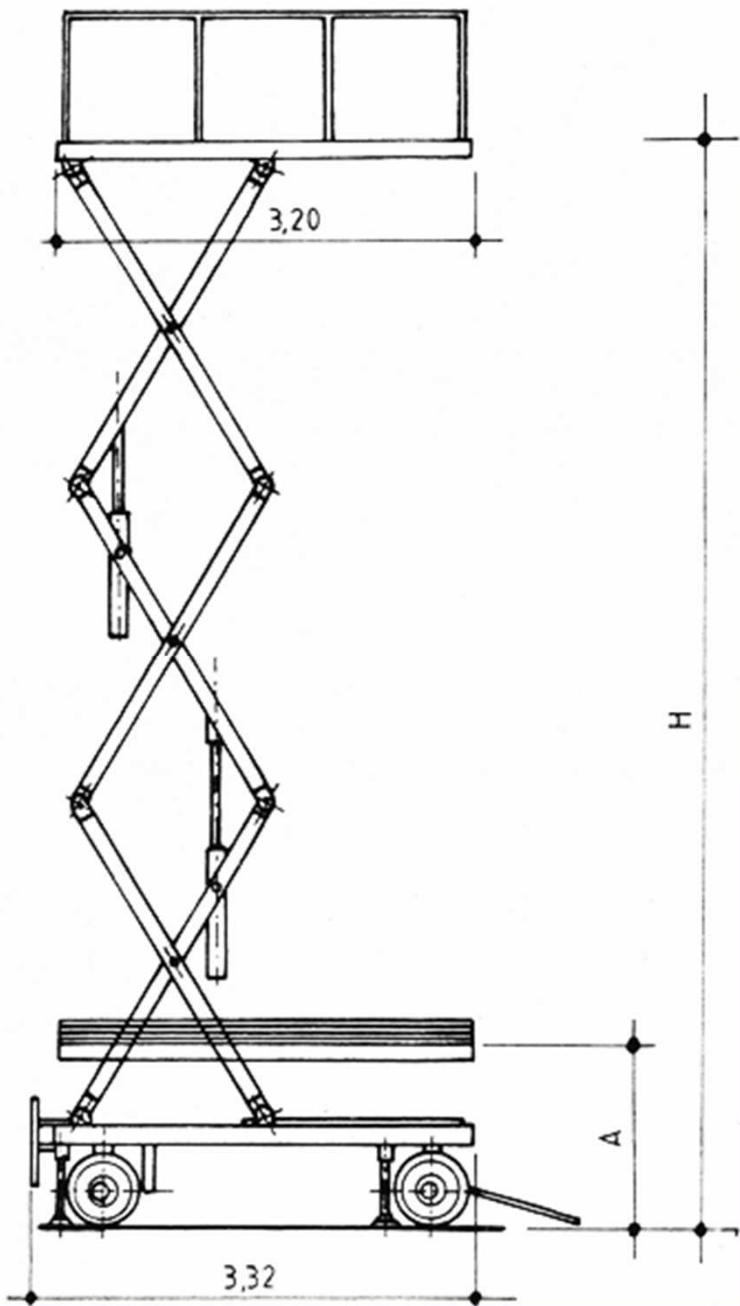


1. sheaves *kötéltárcsák*
2. console *tetőkonzol*
3. lifting cable *tartókötel*
4. drive *kúszó egység*
5. stay line *fogókötel*
6. tension weight *feszítősúly*
7. counter-weight *ellensúly*
8. safety line *biztosító kötel*
9. idler *tetőkonzol görgő*
10. floating line *lengőkábel*
11. control *vezérlés*
12. suspended bridge *függő munkahíd*
13. stabilizer frame post *stabilizáló vázoszlop*

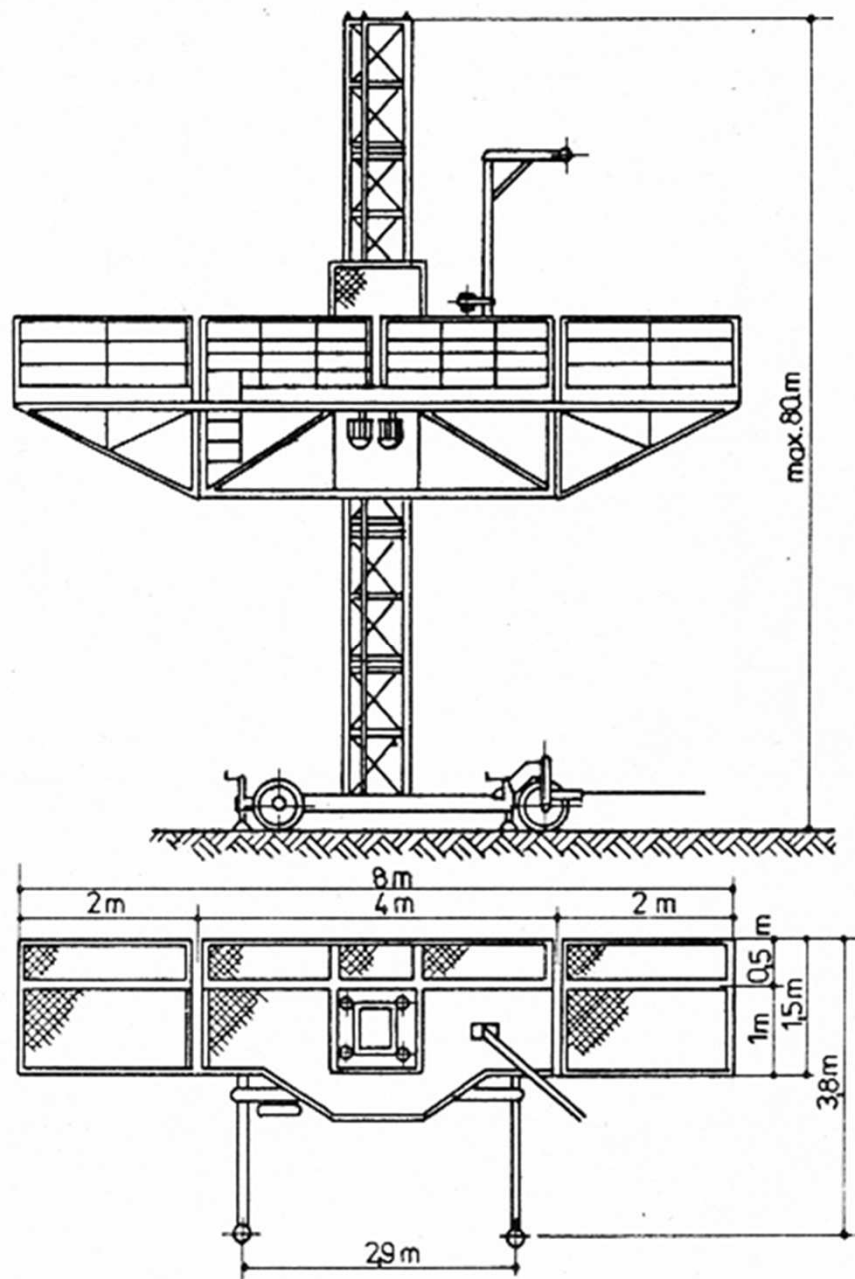


a. single *szimpla*; b. extended *megnövelt*; c. one-man *egyszemélyes függőkas*;
d. multistorey *többszintes*; e. extensible cages *meghosszabbítható munkaállás*

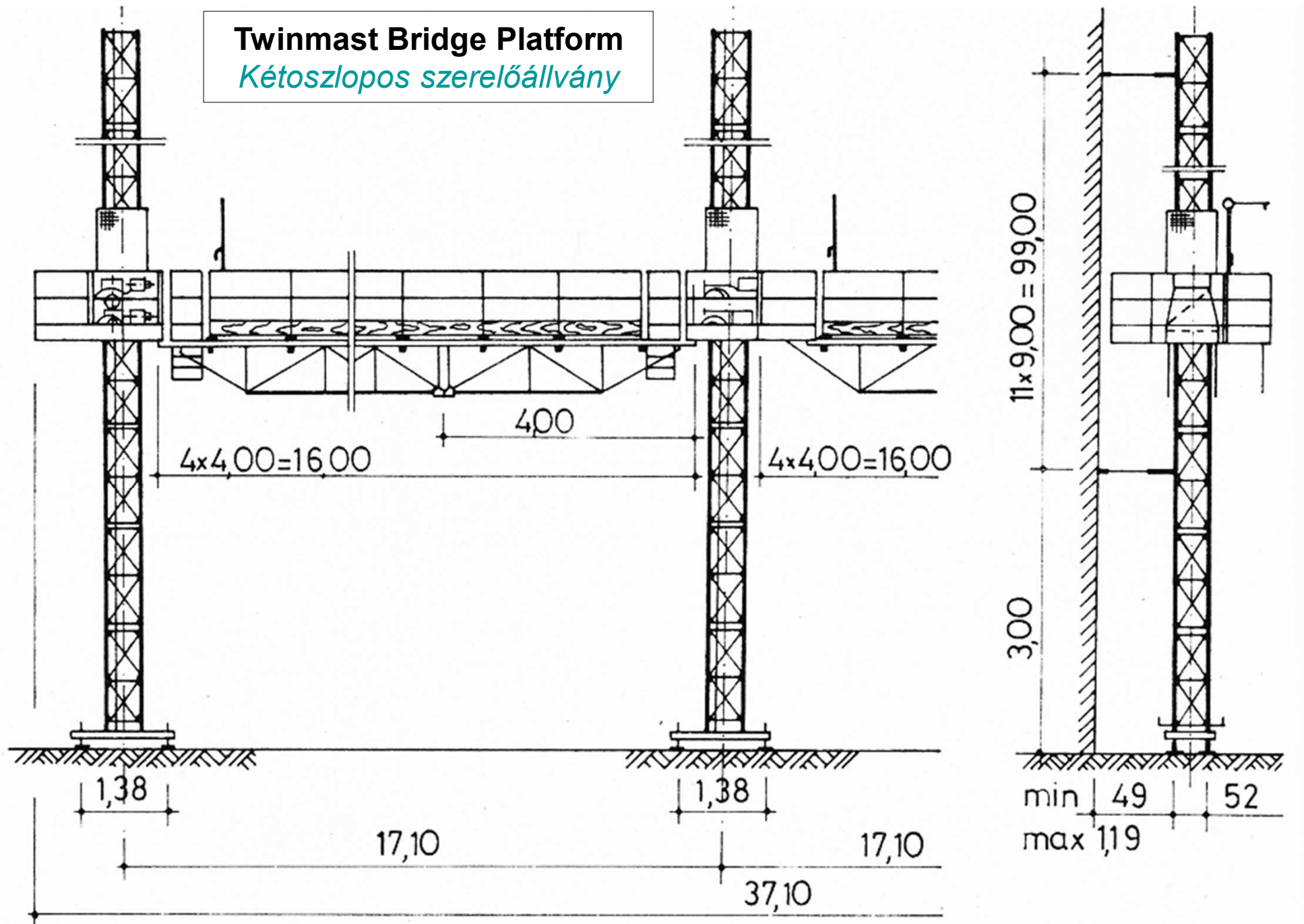
Scissor Lift *Ollós emelő*

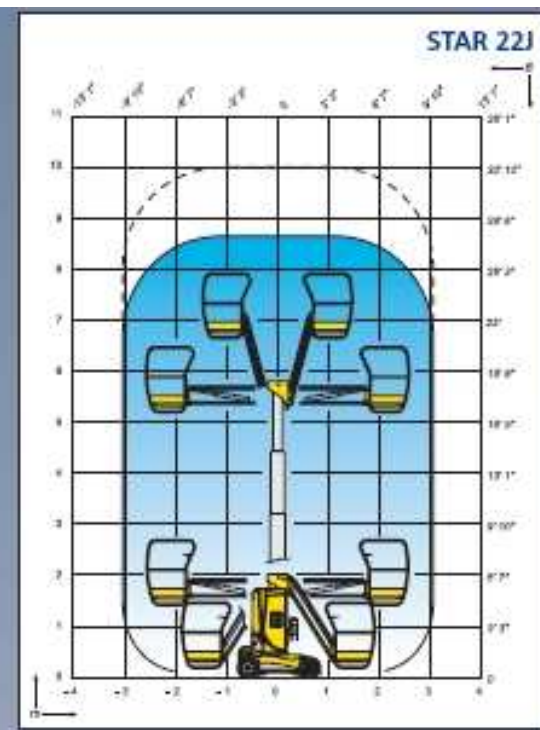
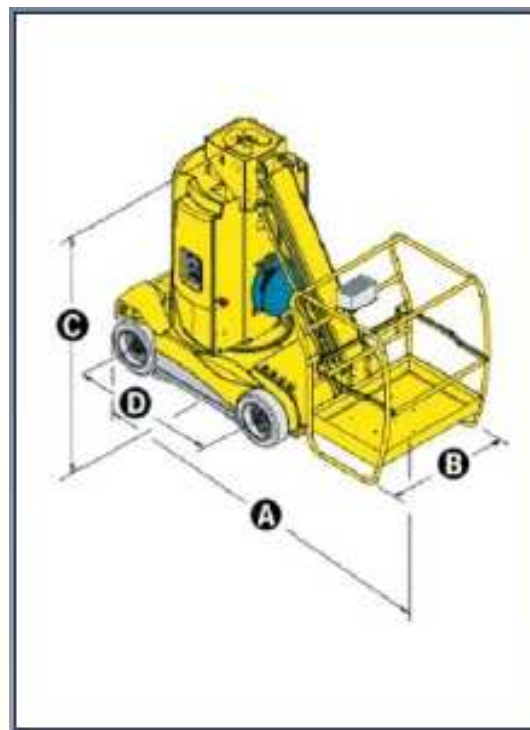
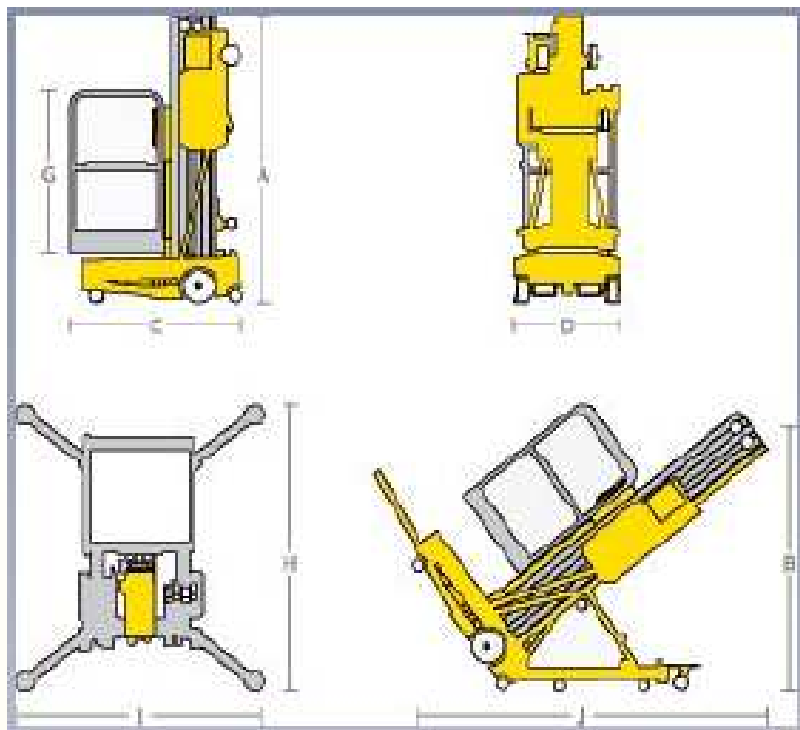


Assembly Platform *Mobil szerelőállvány*

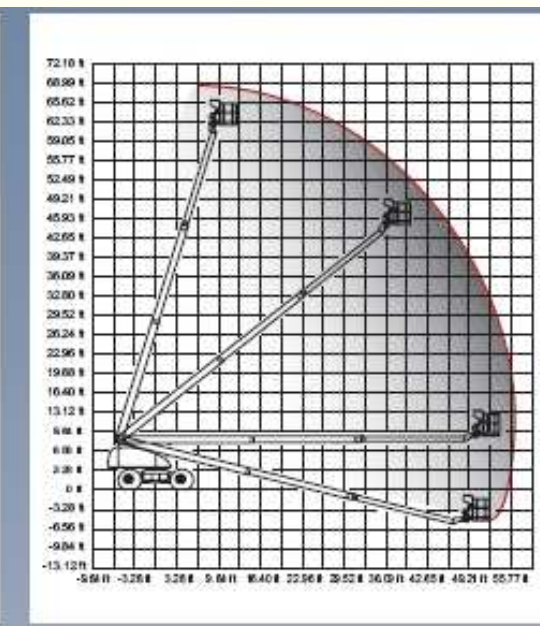
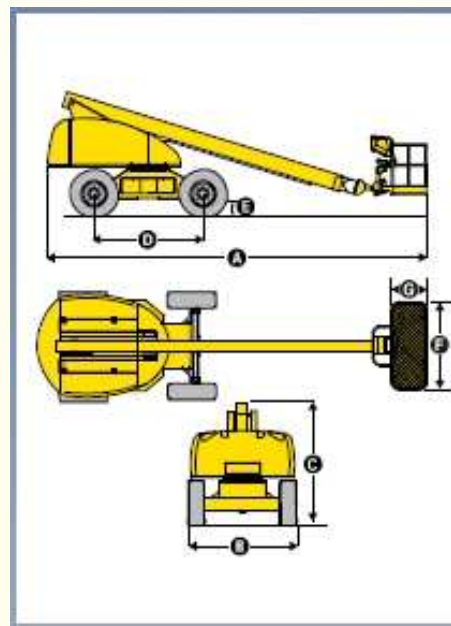
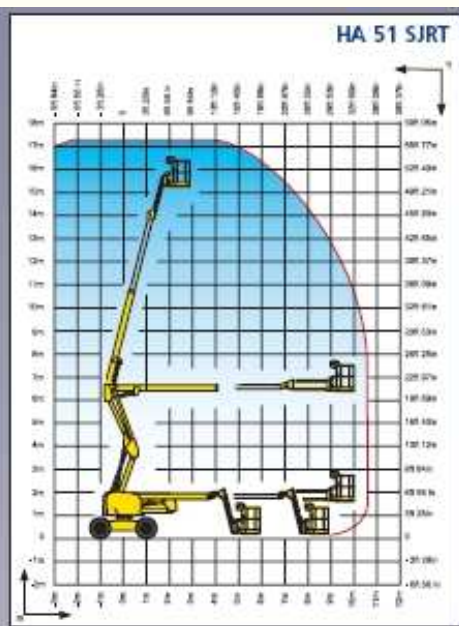
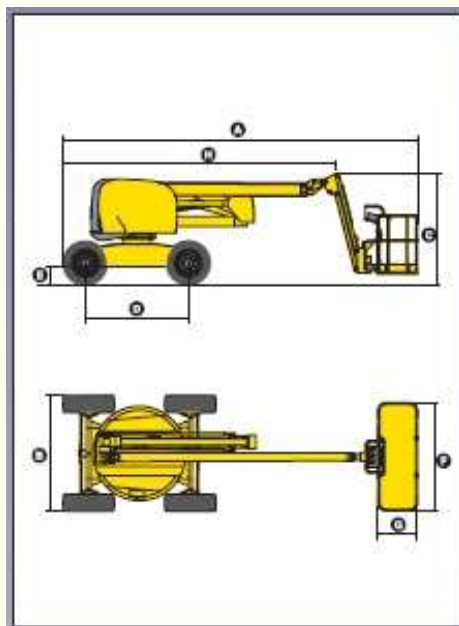


Twinmast Bridge Platform
Kétoszlopos szerelőállvány



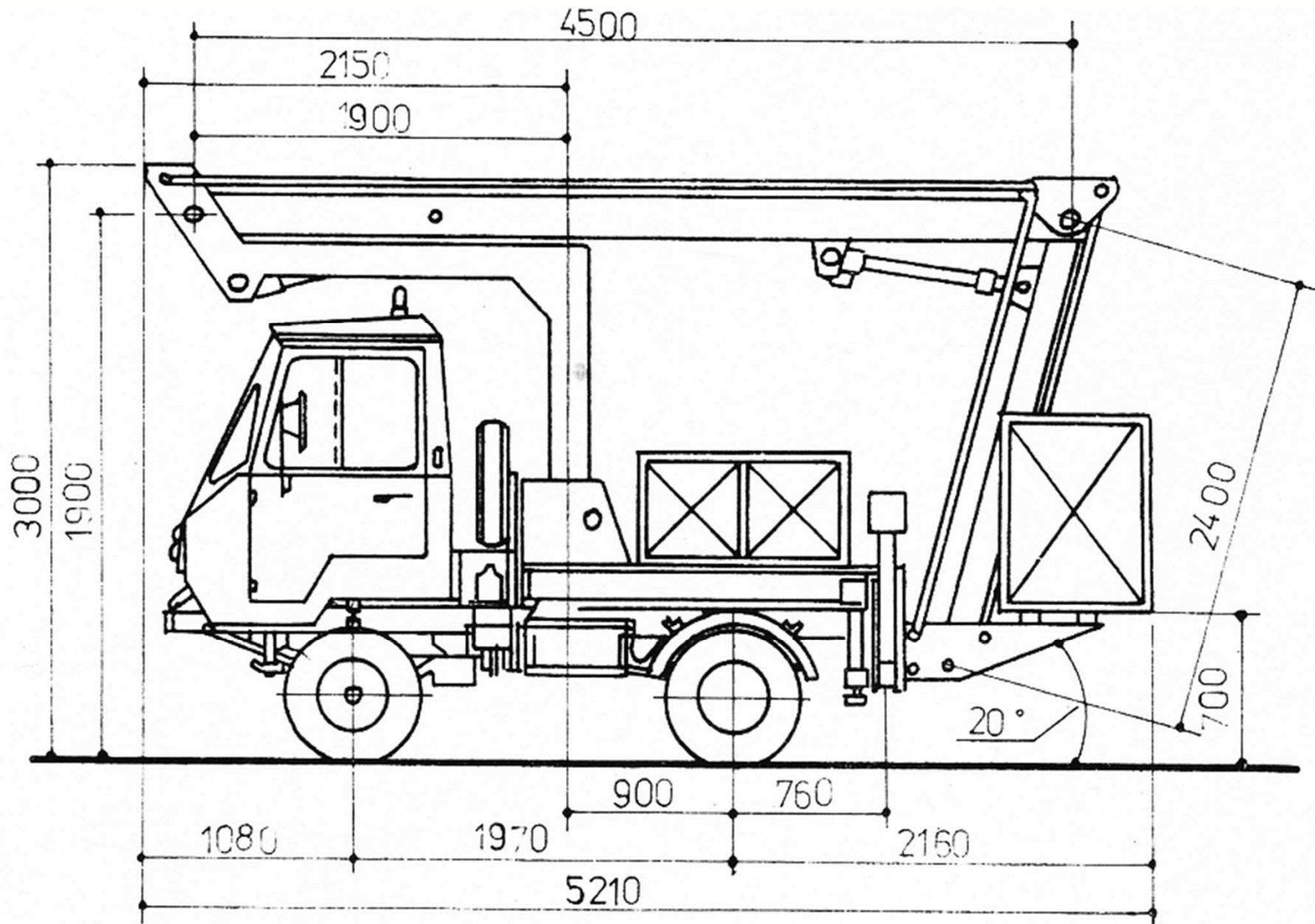


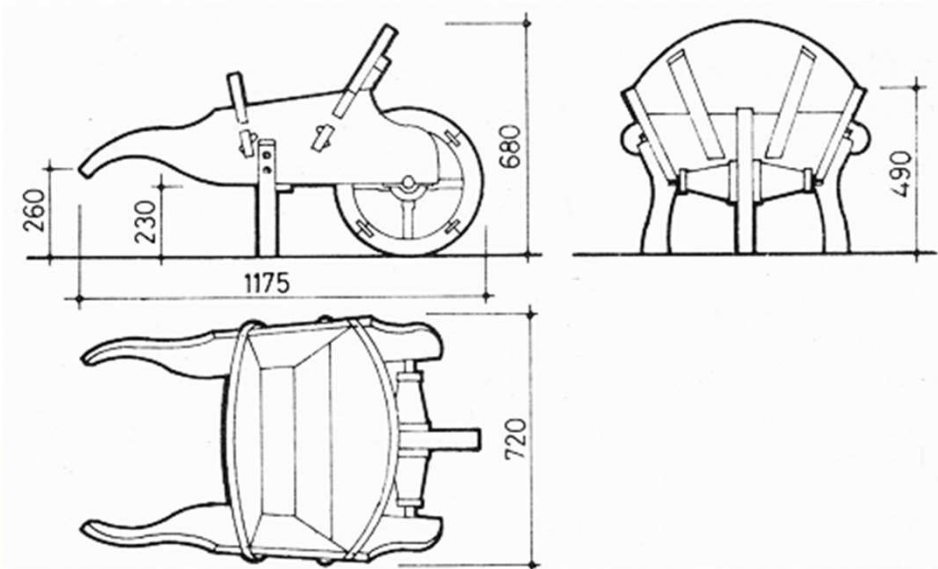
Cage-operated Working Platforms *Kosaras (mobil) szerelőállványok*



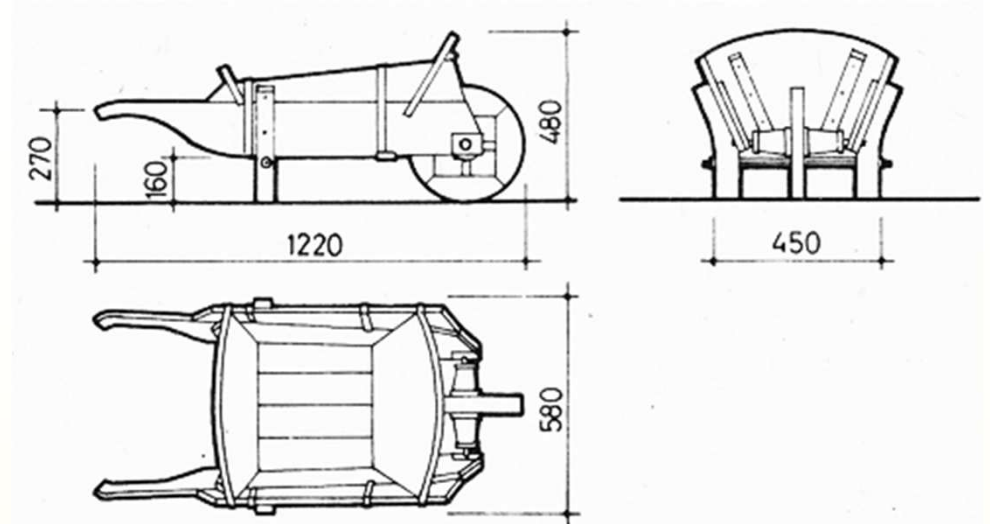
„Multicar” (Articulated, Vehicle-Mounted) Work Deck

„Multicar” (csuklós gémű, járműre szerelt) szerelőkosár



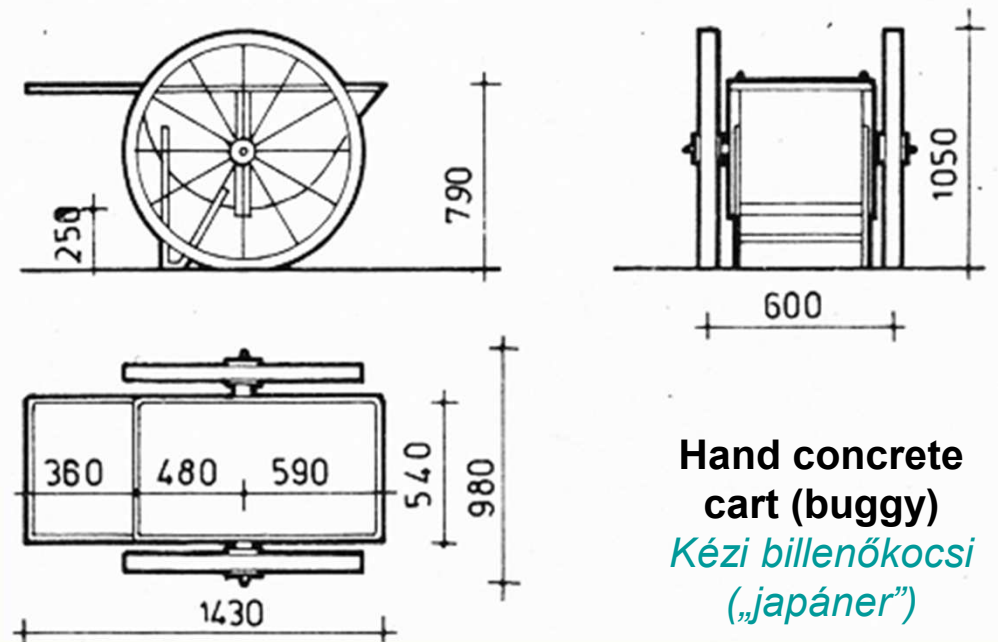
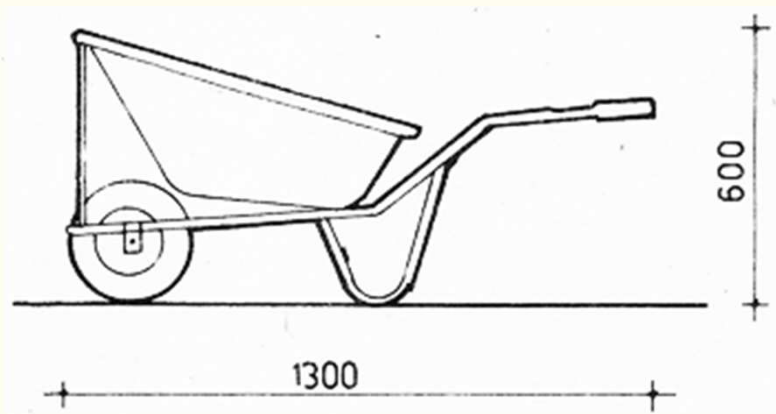


Navy's wheel-barrow *Kubikus talicska*



Builder's wheel-barrow *Fa l d s talicska („furik”)*

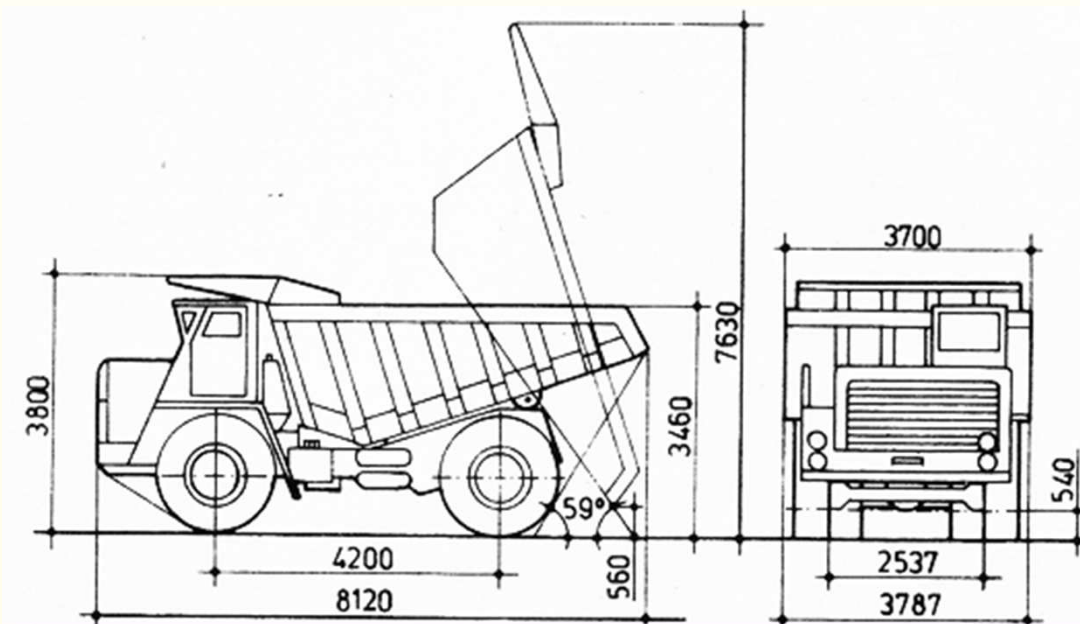
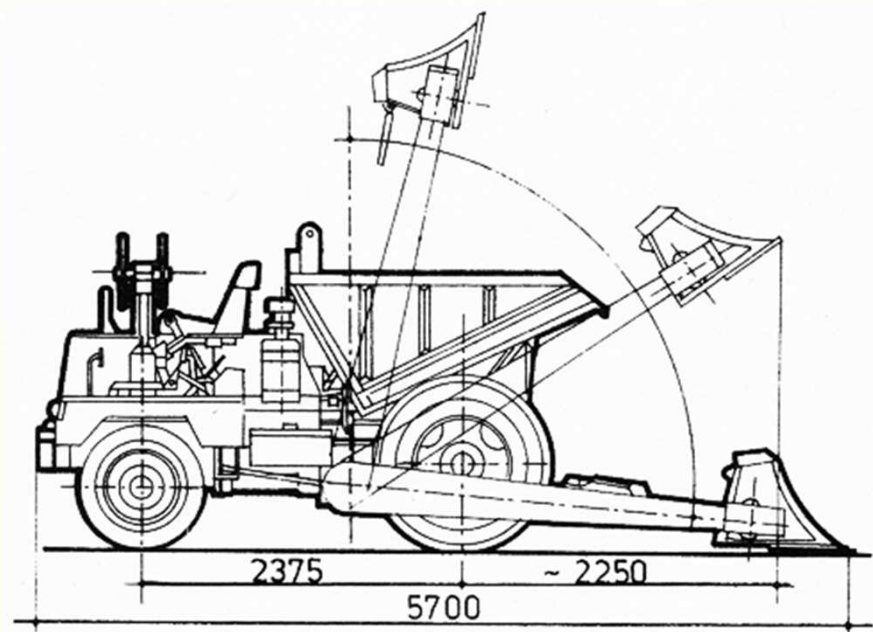
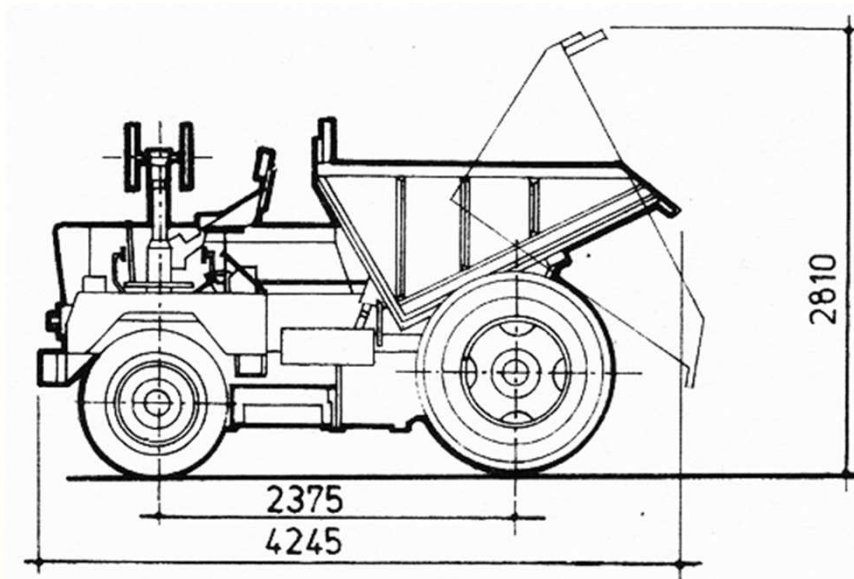
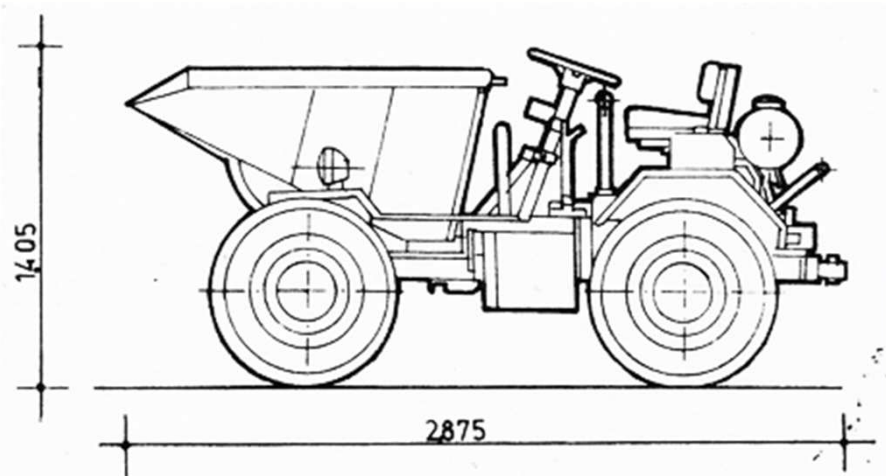
Steel wheel-barrow (general-purpose)
( ltal nos c l ) F m talicska



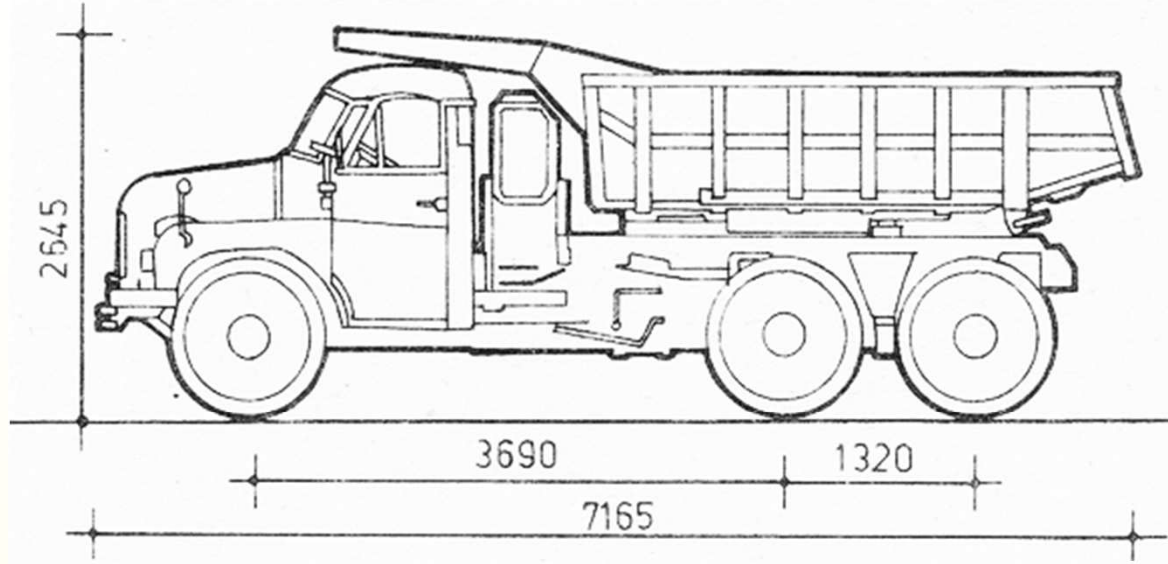
Hand concrete cart (buggy)
K zi billen kocsi („jap ner”)

From wheel-barrows through motobugs (dumpers) to offroad trucks

A talicskától az önrakodó motoros „billencsen” (dömperen) át a nehéz („offroad”) tehergépjárműig

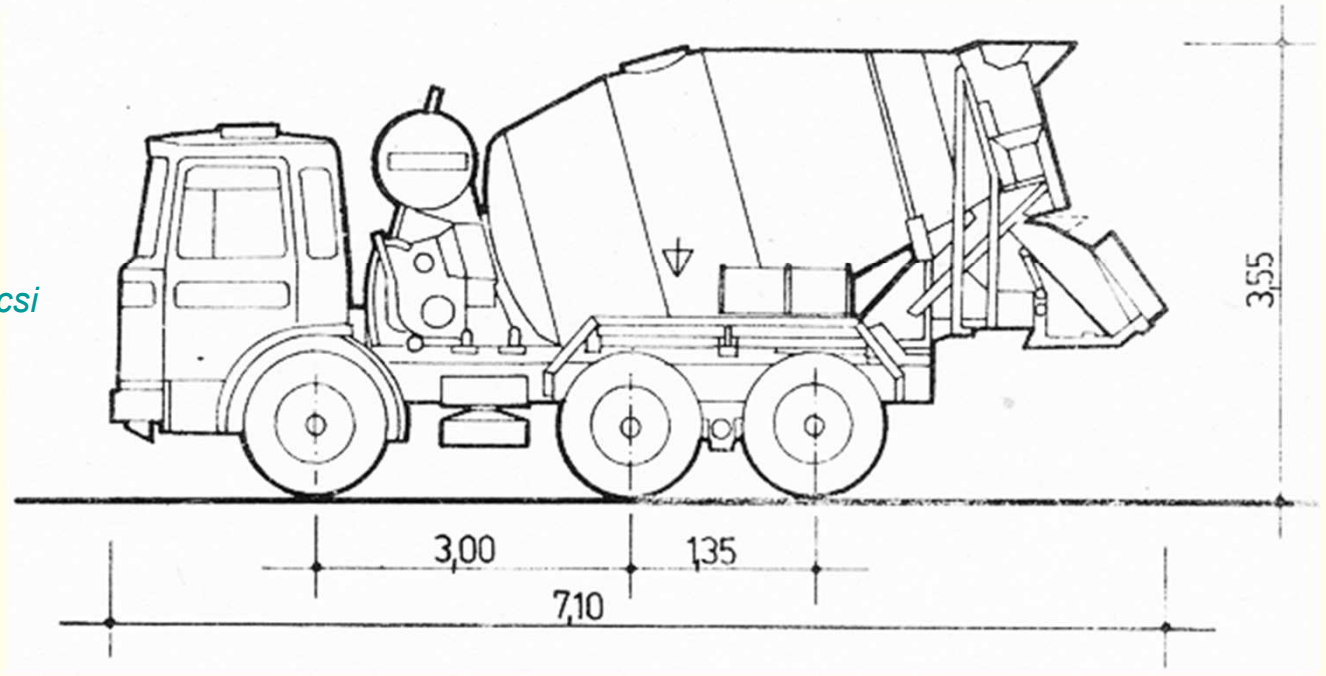


Special-purpose lorries (trucks)
Különleges célú szállítójárművek (tehergépkocsik)

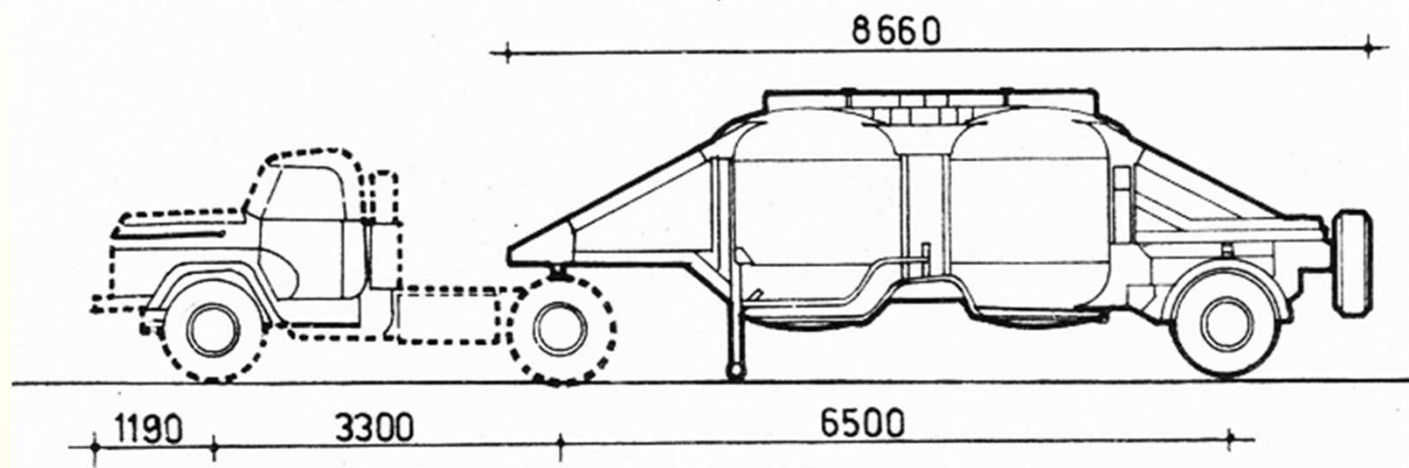
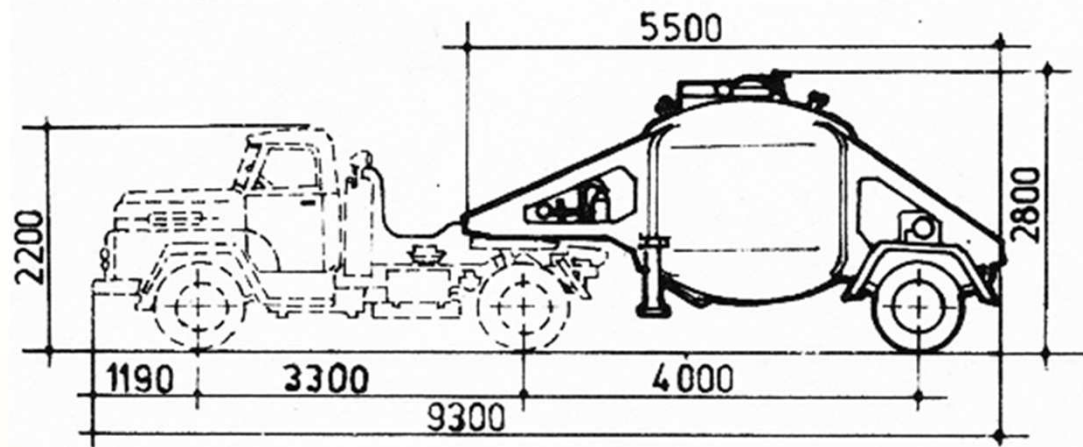


Dumper truck
Billenőplatós tehergépkocsi („dömper”)

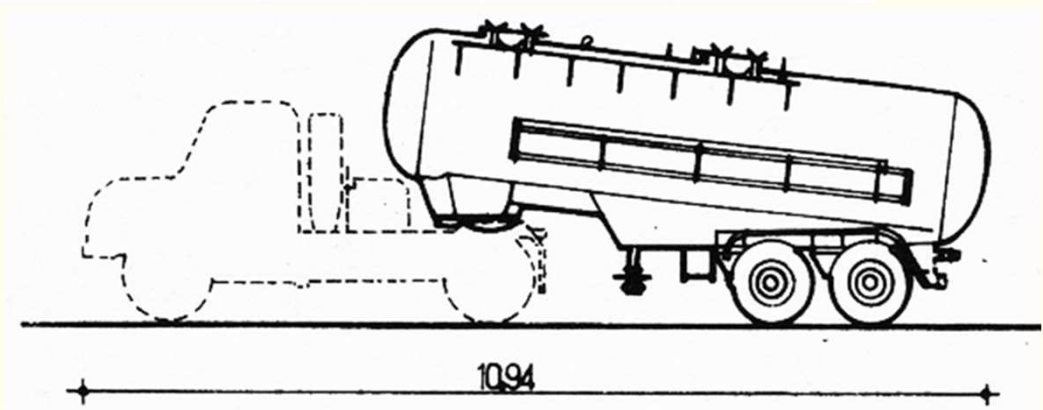
Mixer truck
Betonkeverő tehergépkocsi („mixerkocsi”)



Special-purpose semi-trailers *Különleges célú fél-pótkocsik*

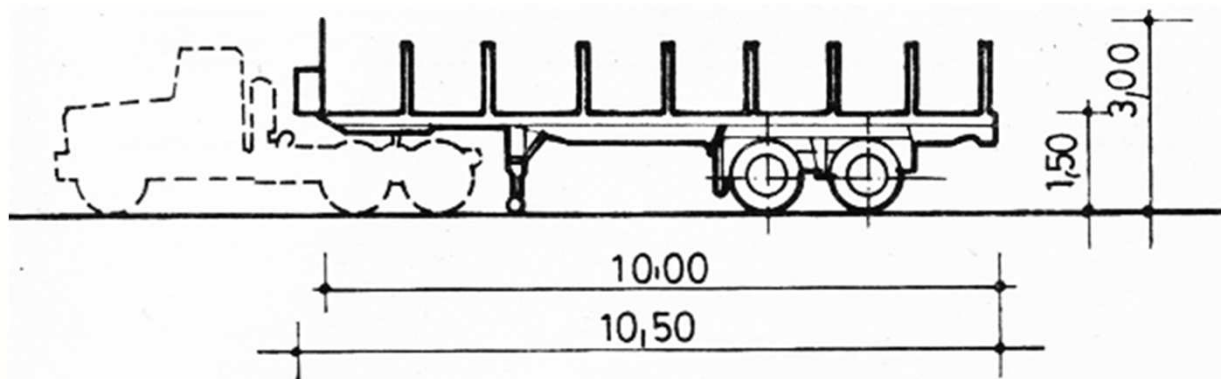


Cement transporters
Cement (poranyag) szállítók
(„körtéskocsik”)

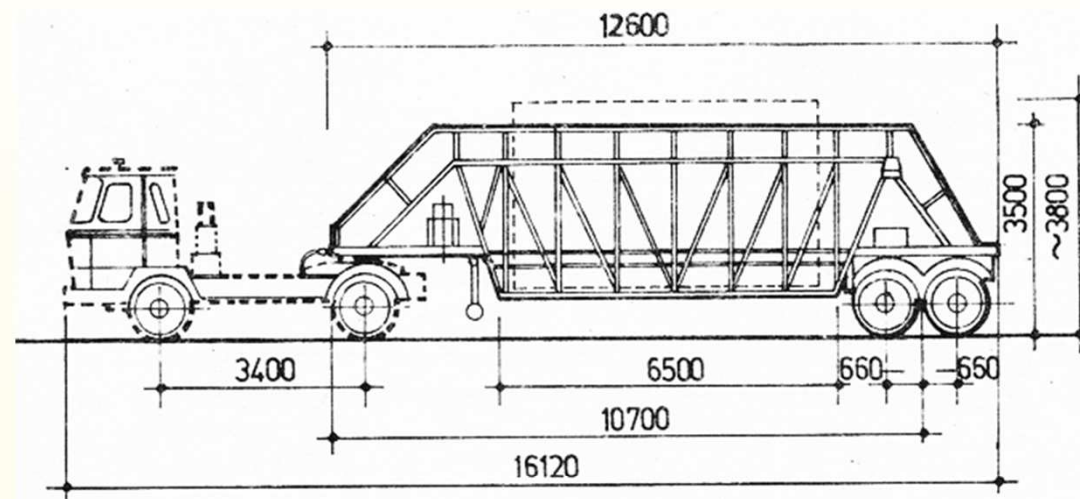


Special-purpose semi-trailers *Különleges célú fél-pótkocsik*

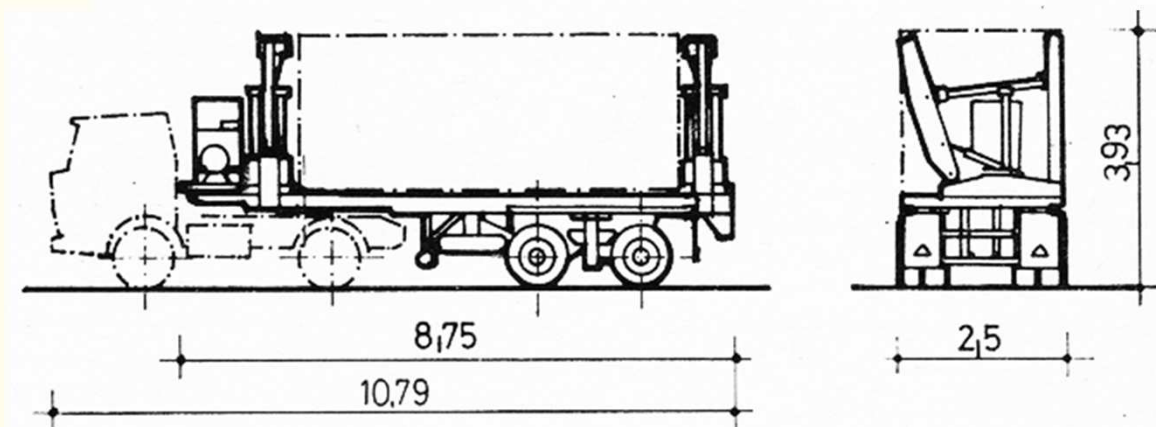
Beam- and pipe (log) transporter
Hosszúanyag (cső, rönk) szállító



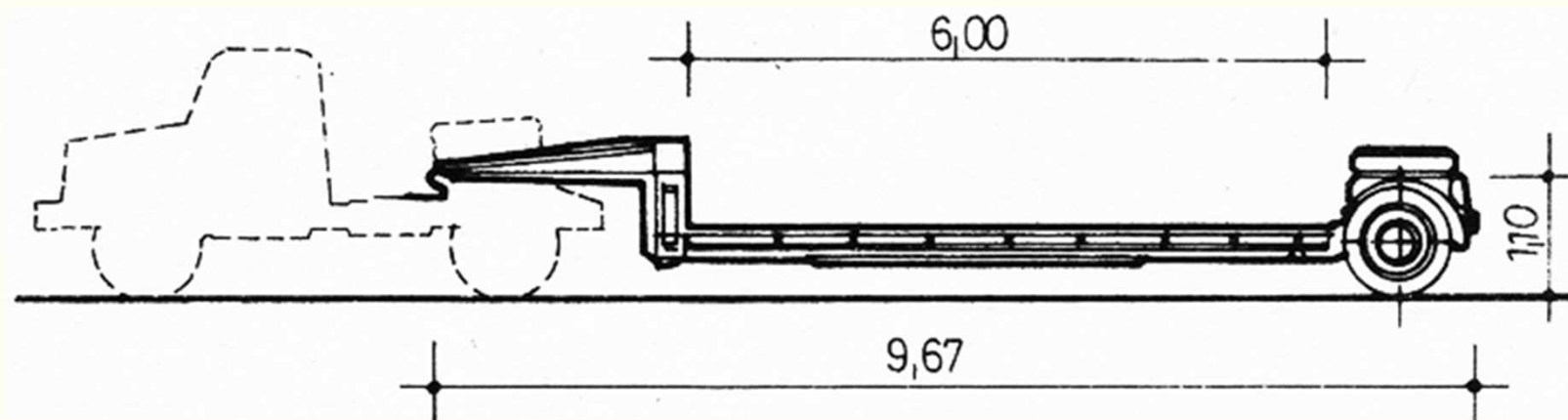
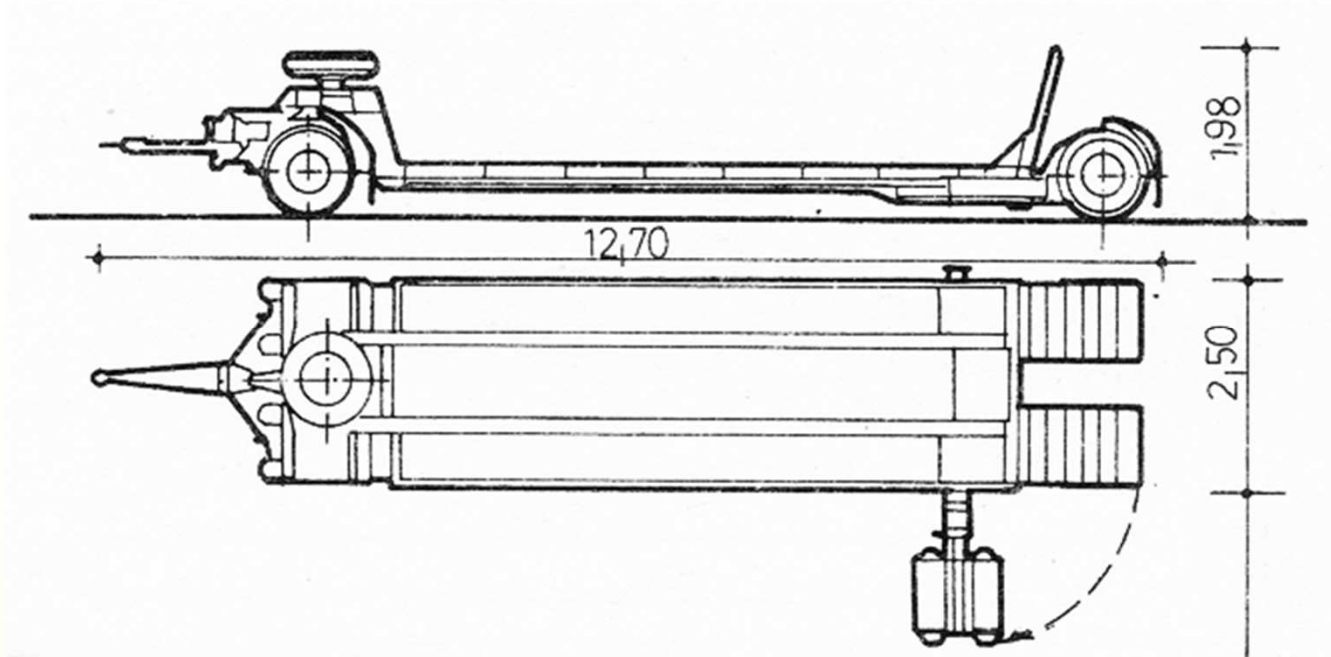
Wall-panel transporter
Nagyelem (panel) szállító



(Self-loading) Container transporter
Rakodódarus konténerszállító

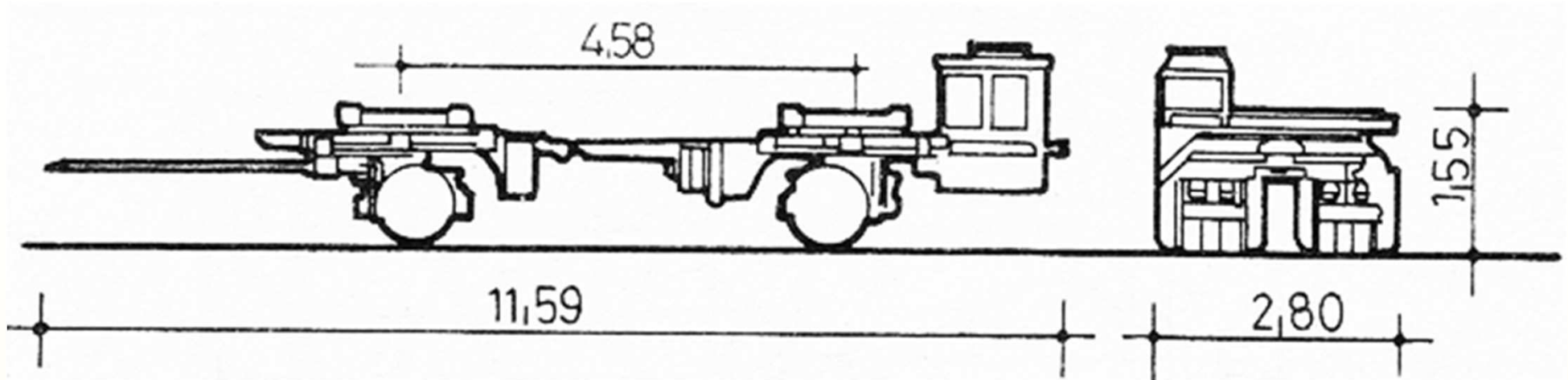


Special-purpose (semi-)trailers *Különleges célú (fél-)pótkocsik*

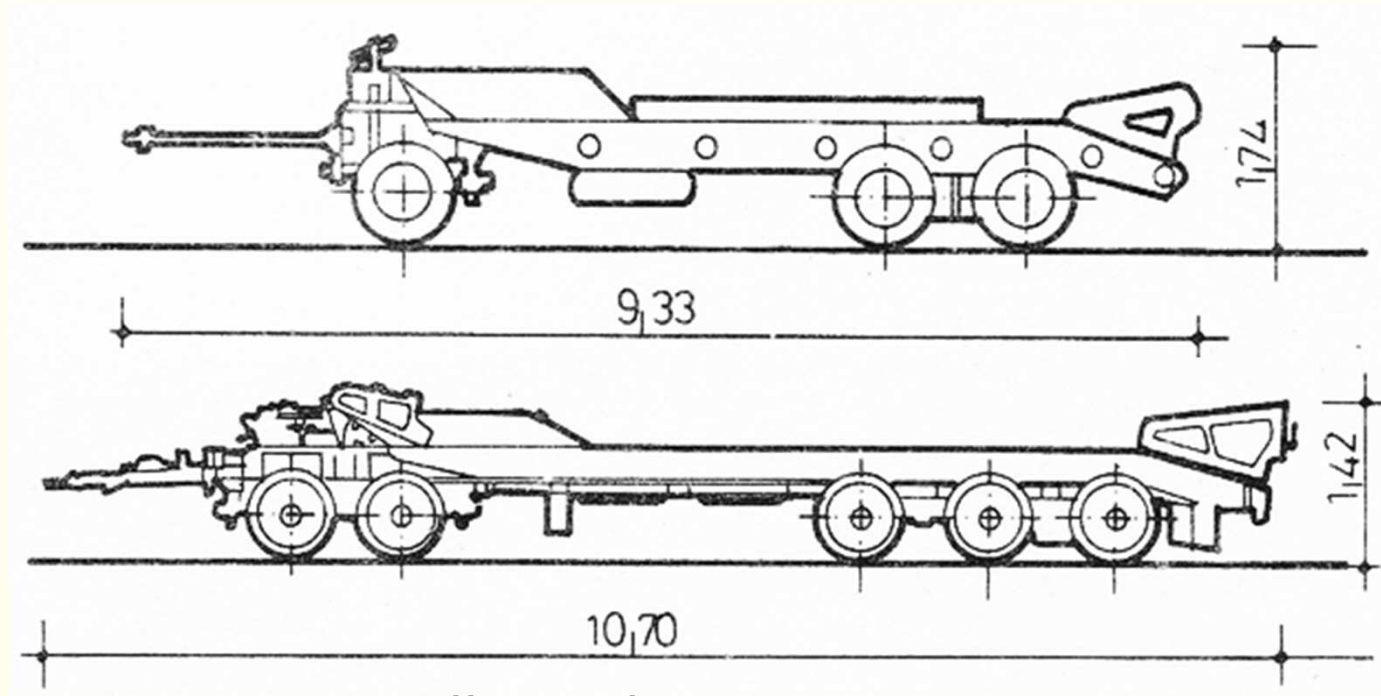


Equipment transporters
Nehézgép (nehézanyag) szállítók

Special-purpose trailers *Különleges célú pótkocsik*

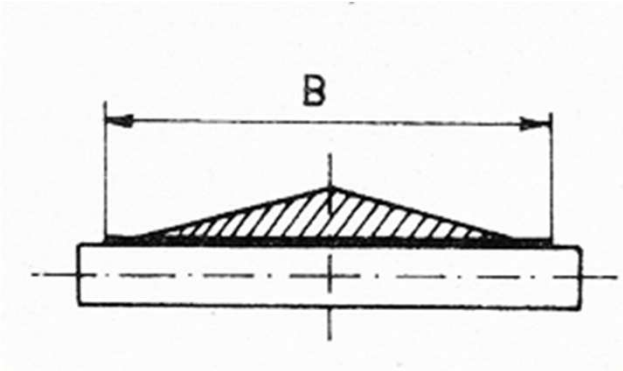


Long freight transporter (with steered rear wheels)
(kormányzott hátsó kerekű) hosszúanyag szállító

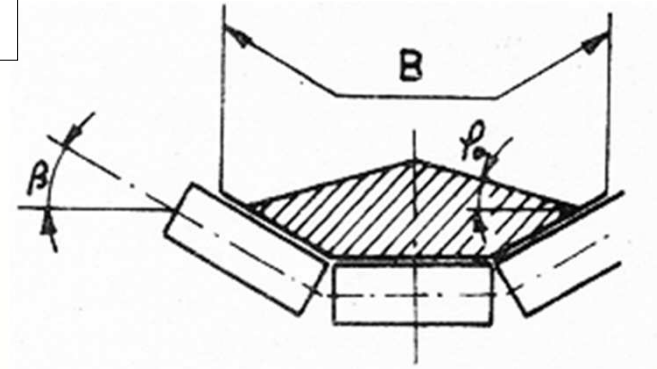


Heavy equipment transporters
Nehézgép szállítók

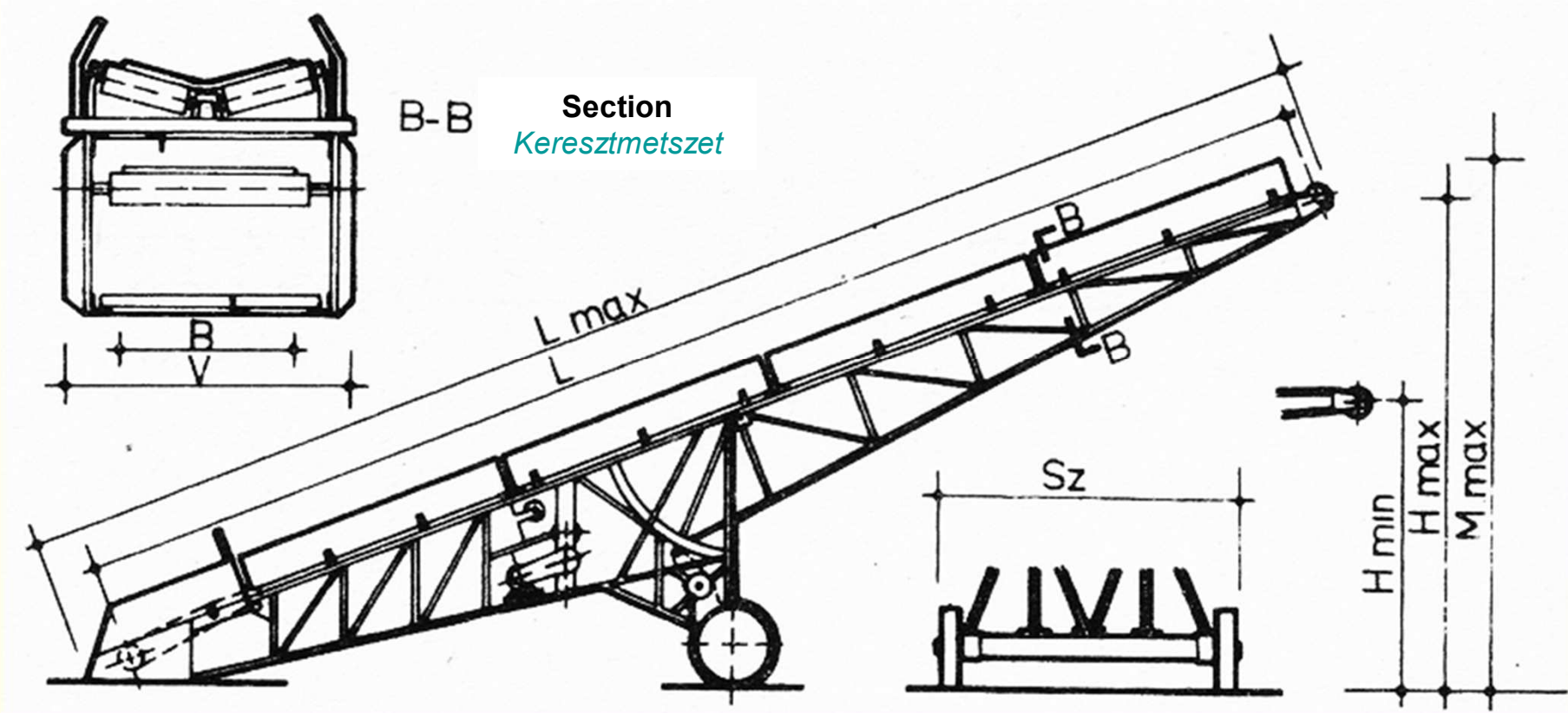
Builder's Conveyor Belt
Építési (mobil) szállítószalag



Flat conveyor
Síkszalag



Trough conveyor
Vályússzalag



Sources of B&W pictures and drawings *A fekete-fehér képek és ábrák forrása:*

- Bacher Károly, Dr. Lánzos Pál, Dr. Soós László, Építésgépesítés I., Tankönyvkiadó, Budapest, 1985
- Dr. Nagy Pál, Építéstechnológia I, Alaptechnológiák, Tankönyvkiadó, Budapest, 1990
- Soós László, Építőipari gépek I., Tervezési segédlet, Tankönyvkiadó, Budapest, 1987
- Soós László, Építőipari gépek II, Tervezési segédlet, Tankönyvkiadó, Budapest, 1987
- Dr. Soós László, Építőipari emelőgépek, Tervezési segédlet, Tankönyvkiadó, Budapest, 1990