DE LAVAL

ΔΙΑΧΩΡΙΣΤΗΣ ΕΛΑΙΟΥ
ΔΙΑΧΩΡΙΣΤΗΣ ΠΕΤΡΕΛΑΙΟΥ

INSTRUCTION BOOK

INDUSTRIAL SEPARATOR
TYPE B 1500 / B 1700C

MANUFACTURING NUMBER: 2861996
2861997

BOOK NO.: S79319E

PRINTED IN SWEDEN

CORRECT INSTALLATION OF THE SEPARATOR

and

PROPER TREATMENT OF THE LIQUID

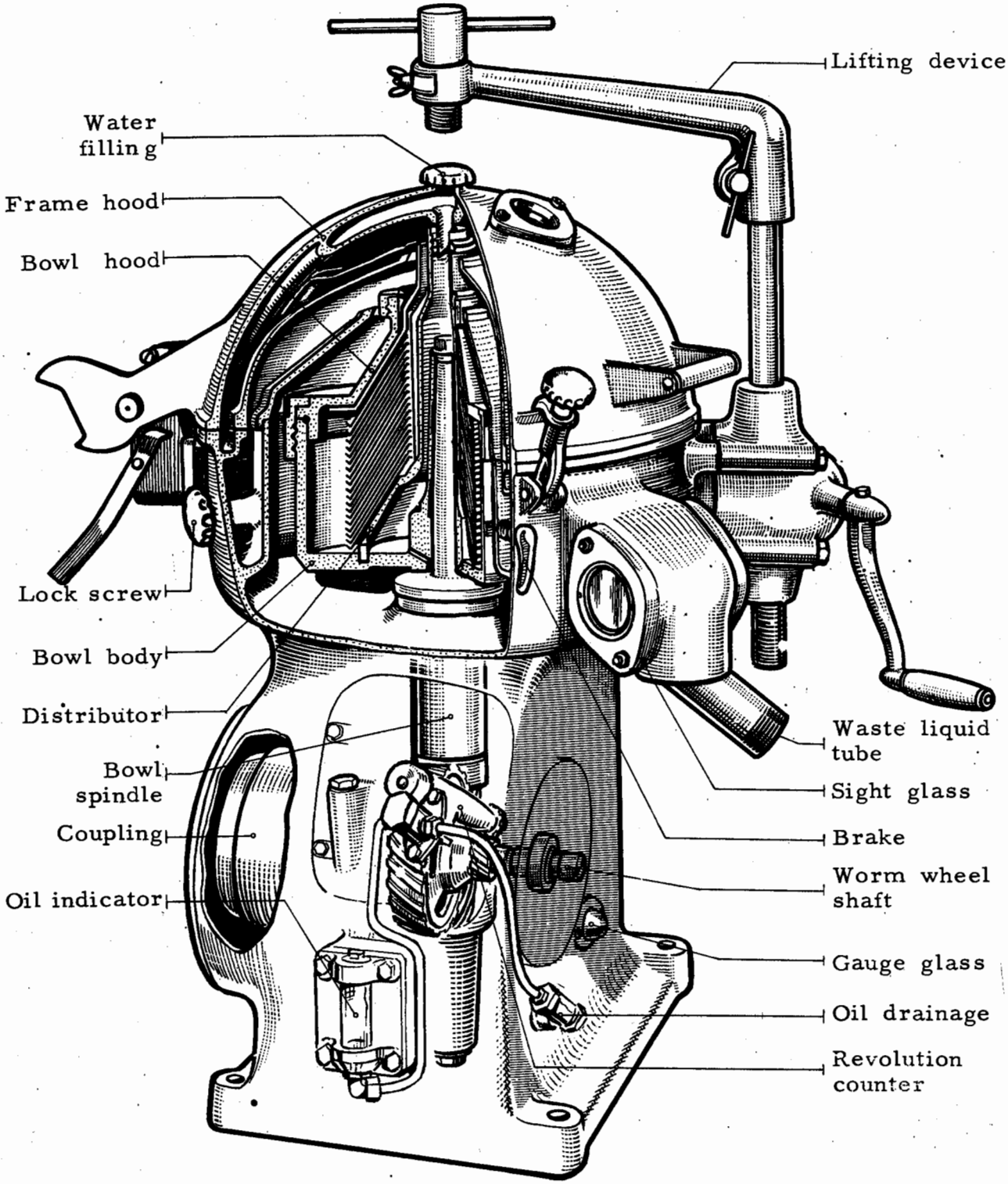
are two factors of the greatest importance for ensuring the **best result.**

The DE LAVAL representatives are always glad to place their experience at your disposal.

WHEN ORDERING

or when returning parts for repair or exchange as well as in all other communication with us concerning any of our separators, please always state the **type** and **serial number** of the separator and the **number of the part.** The type denomination is indicated on the name plate and the serial number is stamped on the name plate as well as on the upper rim of the bowl casing. The part number appears from the parts list and is also, when possible, stamped on the part itself.

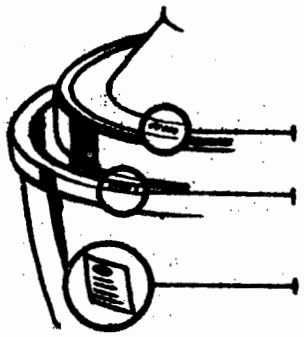
Note! When ordering, always state the **part number** and thus not the letters or figures by which it may be designated in the parts lists, text or illustrations of the Instruction Manual.


Lifting device
Water filling
Frame hood
Bowl hood
Lock screw
Bowl body
Distributor
Bowl spindle
Coupling
Oil indicator
Waste liquid tube
Sight glass
Brake
Worm wheel shaft
Gauge glass
Oil drainage
Revolution counter

For quick DELIVERY of separator parts etc. - please state:

- o Type Denomination - see type plate or instruction book
- o Serial Number - see type plate, instruction book, top rim of bowl casing, or separator bowl

  Note: If the bowl has been exchanged or two or more bowls are used with one and the same machine, ALWAYS state,
  when ordering BOWL parts: the seven-figure Manufacturing Number stamped on the BOWL in question
  when ordering OTHER parts: the Manufacturing Number indicated on the TYPE PLATE or on the top rim of the the BOWL CASING
- o Quantity, Name and Part Number



S69087E
782917

MODEL order-form:

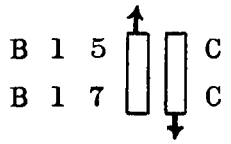
Type Denomination .....

Serial Number: separator .....
bowl.....

Quantity	Name	Part number	Belongs to
2	Lining	.....	brake
1	Motor belt pulley	.....	
1	Packing	.....	bowl spindle

TYPE DENOMINATIONS. The third figure in the numerical series of the type denomination indicates the separating method, and the fourth the mode of drive of the separator:

1 - purification
2 - the separator can be used (after exchange of certain bowl parts) either for clarification or for purification
3 - clarification
0 - separating method not indicated



4 - direct drive from flange motor
7 - belt drive from separate motor
8 - belt drive from transmission shaft
9 - direct drive from motor on bracket
0 - mode of drive not indicated

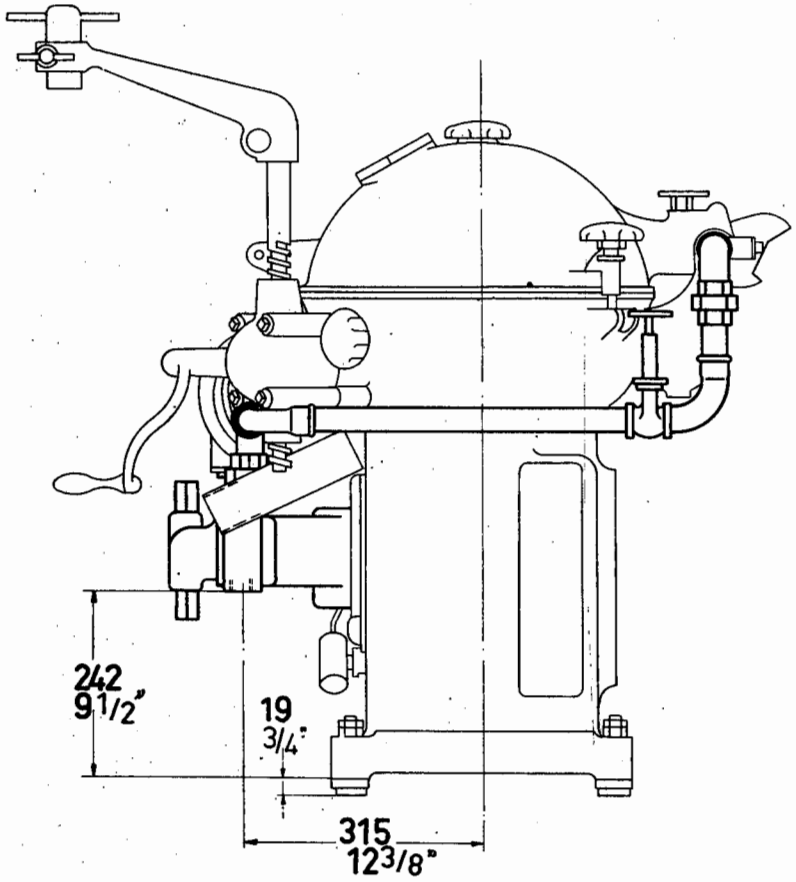
The denomination B 1714 C thus means that the separator works as a purifier and is equipped for direct drive from a flange motor.

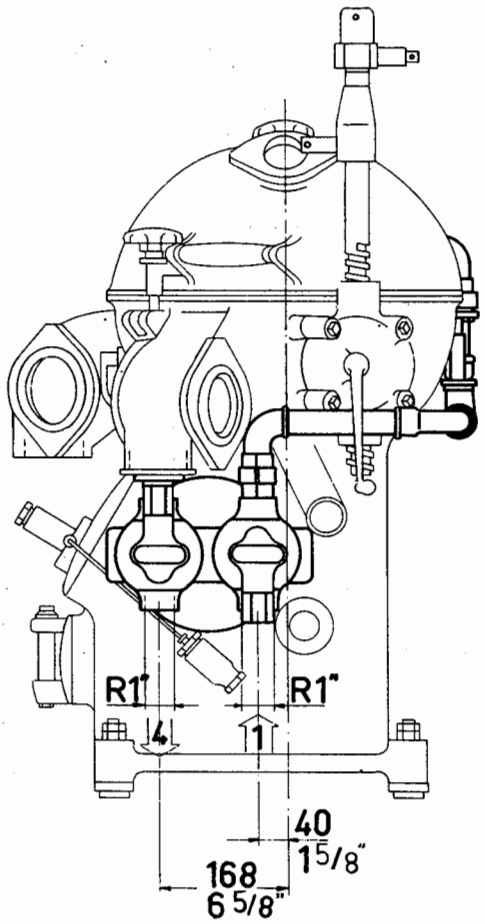
"-60" added at the end of the type denomination means that the power transmission of the separator is suited for a line frequency of 60 C/S.

LEGEND TO THE FOLLOWING DIMENSIONED DRAWINGS:

1 Liquid to be treated
4 Light liquid component
5 Heavy liquid component
8 Bowl casing drain
9 Inlet for liquid seal (plug)
12 Flushing liquid
13 Self-drainage

ALFA·LAVAL
DE LAVAL





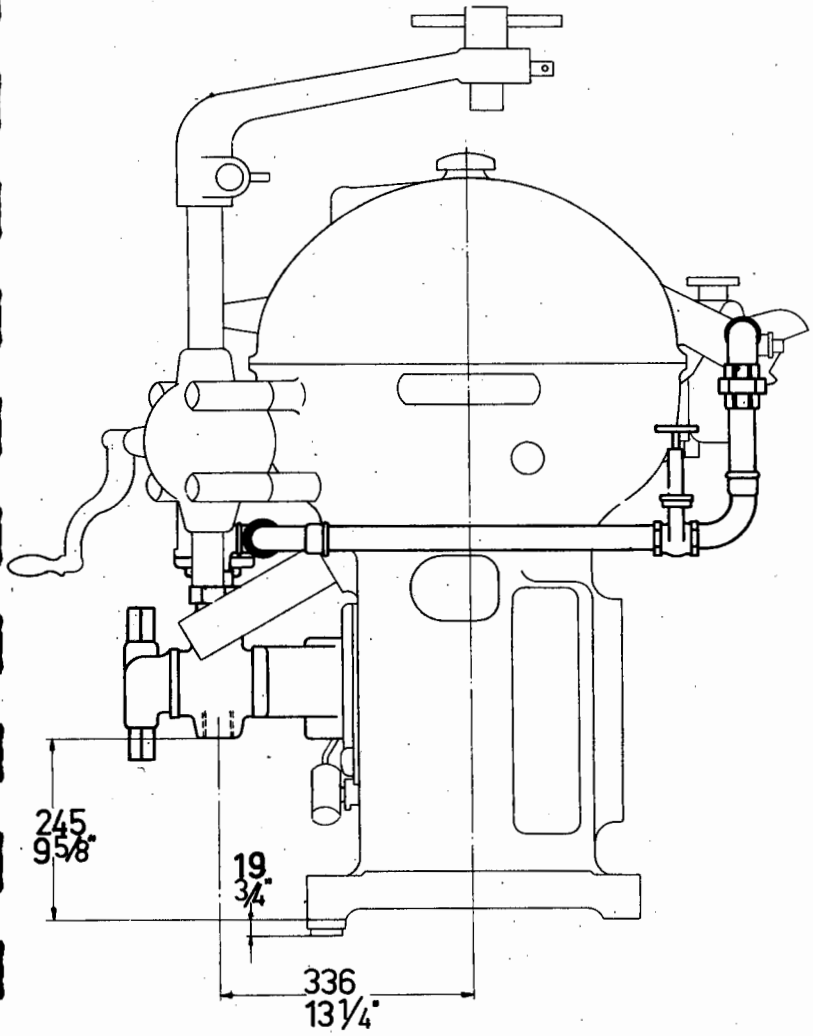
B1500 C

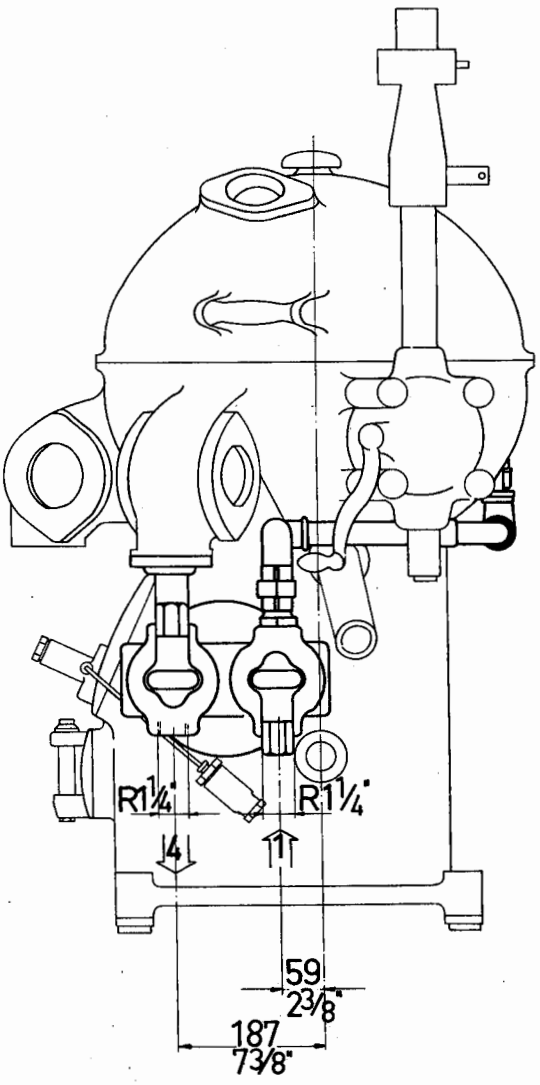
med till- och avloppspump och rör

with feed and discharge pump and pipes (pumps-separator)

mit Zu- und Auslaufpumpe, sowie Rohre (Pumpen-Separator)

ALFA-LAVAL
DE LAVAL





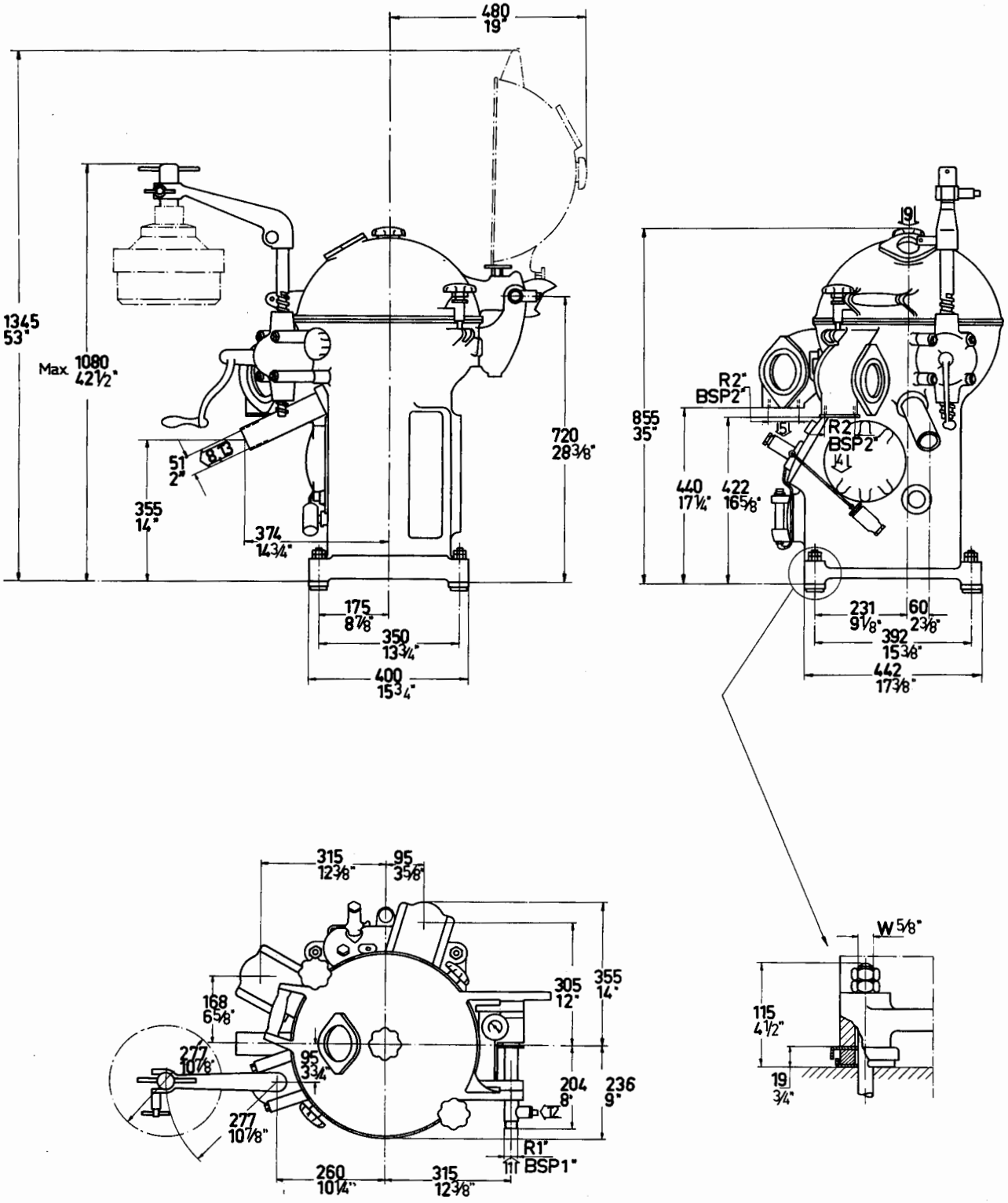
B 1700C

med till- och avloppspump och rör

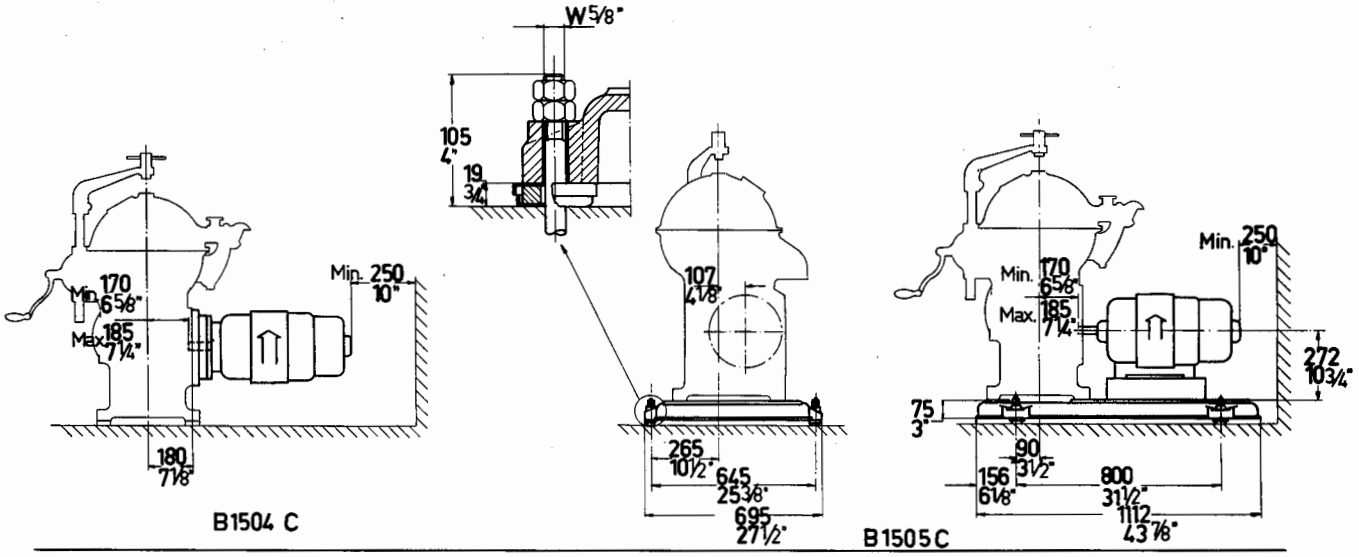
with feed and discharge pump and pipes (pumps-separator)

mit Zu- und Auslaufpumpe, sowie Rohre (Pumpen-Separator)

ALFA-LAVAL
DE LAVAL

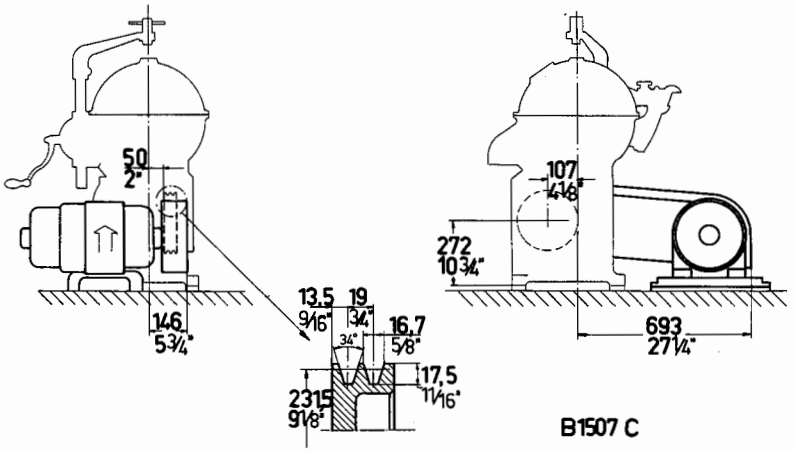


B 1500 C

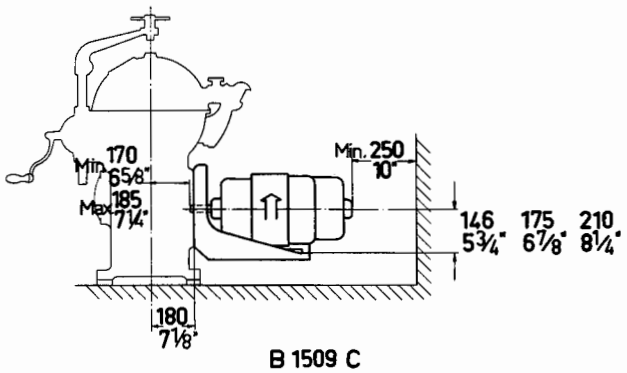


B1504 C

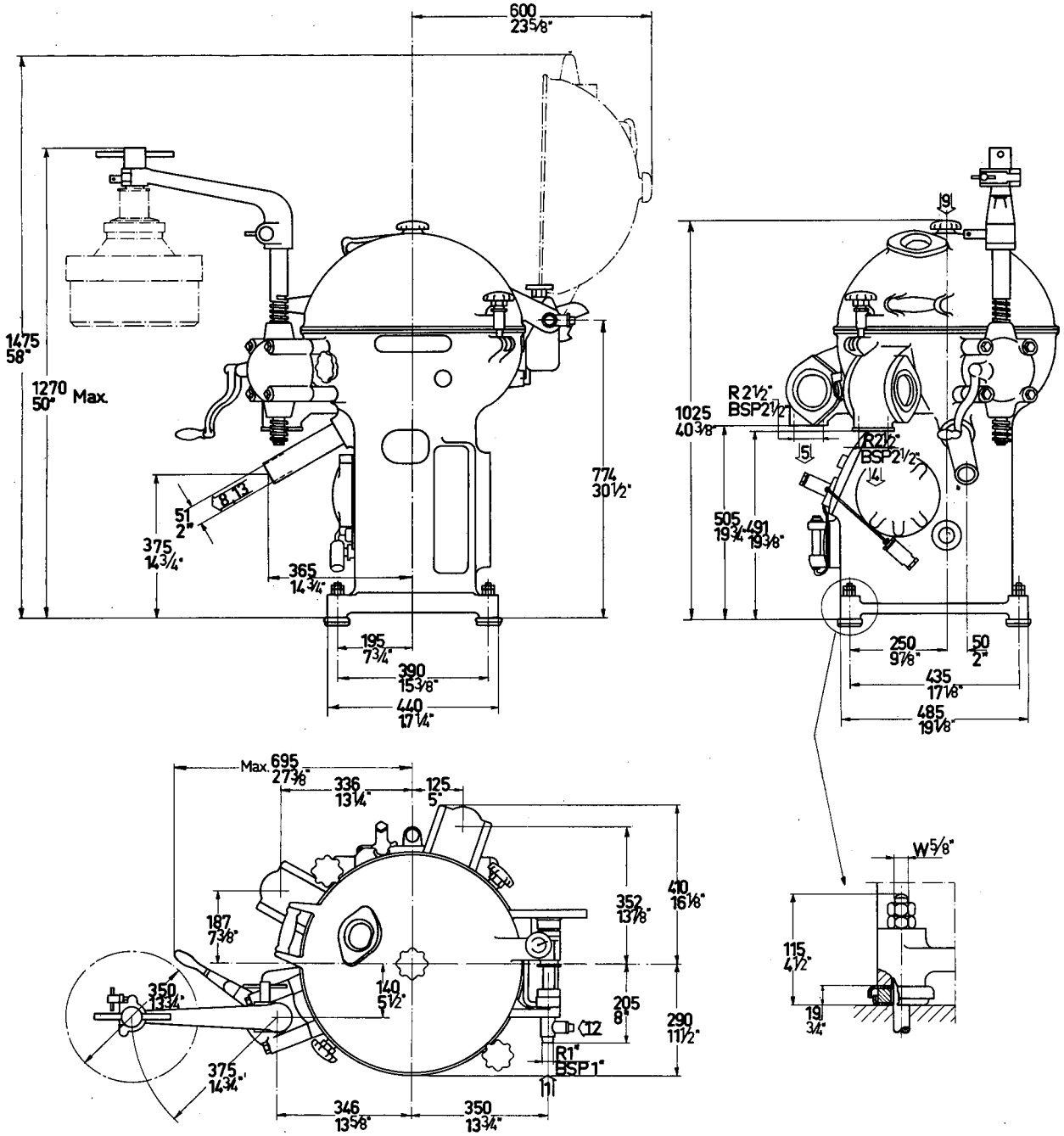
B1505 C



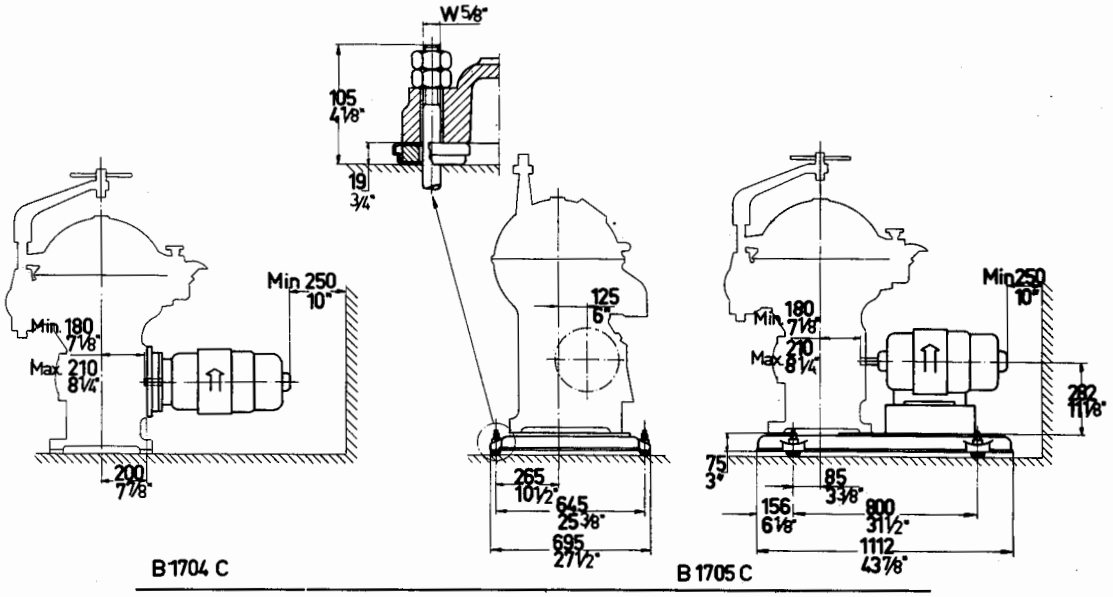
B1507 C



B 1509 C

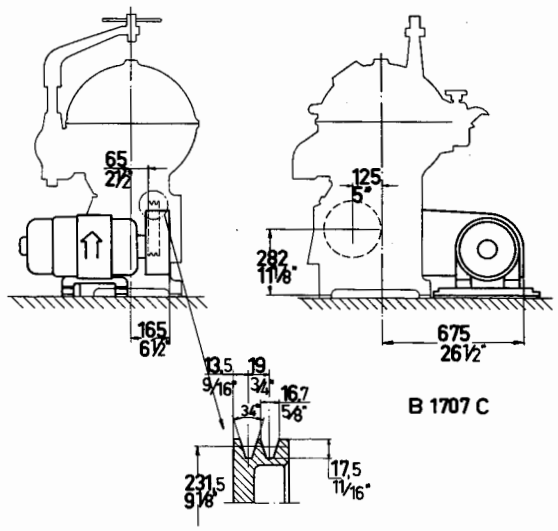

600
23⅝"
1475
58"
1270
50"
Max.
774
30½"
51
2"
375
14¾"
365
14¾"
195
7¾"
390
15⅜"
440
17¼"
R 13
1025
40⅜"
R 2½"
BSP 2½"
505
19¾"
491
19⅜"
250
9⅞"
50
2"
435
17⅛"
485
19⅛"
Max. 695
27⅜"
336
13¼"
125
5"
352
13⅞"
410
16⅛"
187
7⅜"
140
5½"
205
8"
290
11½"
350
13¾"
375
14¾"
346
13⅝"
350
13¾"
R1"
BSP 1"
W 5/8"
115
4½"
19
¾"

B 1700 C



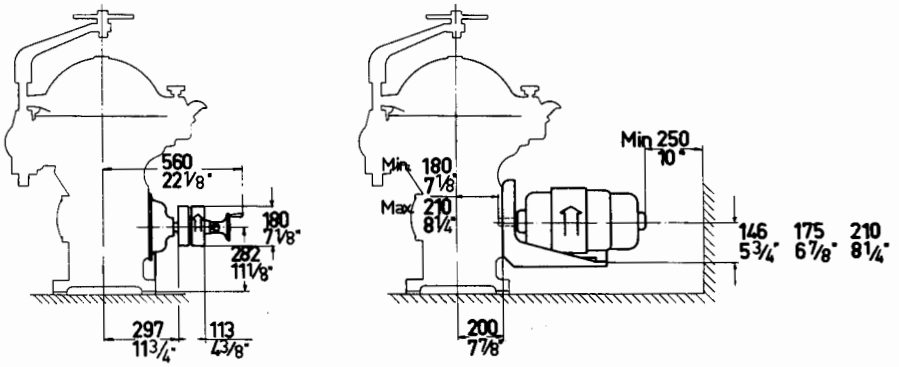
B 1704 C

B 1705 C



B 1707 C

B 1707 C



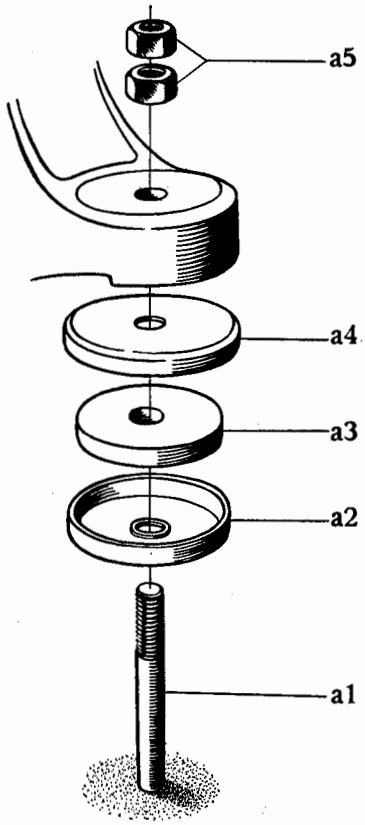
B1708 C

B 1709 C

The separator should be mounted on a level and solid foundation, in which 5/8" anchor bolts have been fastened so as to correspond to the holes in the frame foot. The bolts must not touch the hole edges. The free bolt length above the foundation should be $4\frac{1}{2}$" (115 mm).

Slip over the bolts in this sequence: The cups a2, rubber cushions a3 and cup covers a4. Put the separator frame in place and level it. For the levelling use slotted metal shims, which should have the same size as the cups a2 and be placed between these and the foundation. Screw down the lower nuts a5 until they JUST TOUCH the frame. Hold the nuts in this position and lock them with the upper nuts a5.

Fasten the holder V6 (see Fig. TOOLS in PARTS LIST) for the bowl spindle on a bench near the separator.



Securing separator frame

PIPE LINES

Suitable pipe dimensions are as follows:	Type B 1500	Type B 1700
feed pipe (for separator without pump)	1"	1"
feed pipe (for separator with pump)	1"	1 1/4"
water discharge pipe	2"	2 1/2"
discharge pipe from bowl casing of frame	2"	2"
oil discharge pipe (for separator without pump)	2"	2 1/2"
oil discharge pipe (for separator with pump)	1"	1 1/4"

These pipe dimensions apply to normal plants. If some line is made extraordinarily long or necessitates the use of many bends, its diameter must be increased.

All pipes connected to the separator should be fitted in such a way that no stresses will arise. Besides, the feed and discharge pipes should be fitted so as to leave free head room for swinging up the frame hood.

POWER REQUIRED AND SUITABLE MOTOR OUTPUT

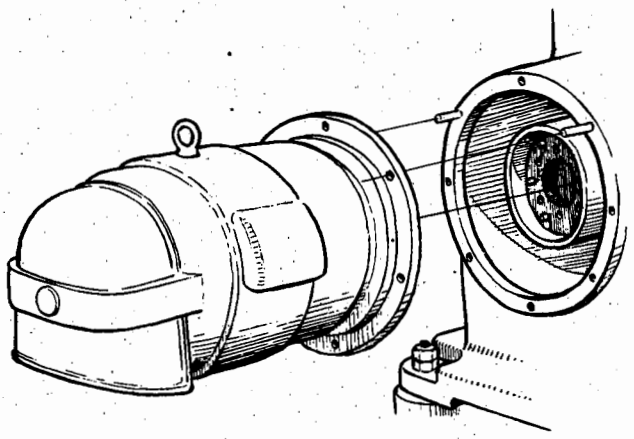
Type	Power required (HP)		Suitable motor output (HP)
	during running-up period (2-3 min.)	in normal operation (depending on throughput)	
B 1500 without pump	3.0	1.6	2.4
B 1500 with 1 pump	3.0	2.0	2.4
B 1500 with 2 pumps	3.0	2.3	2.4
B 1700 without pump	4.2	2.2	3.5
B 1700 with 1 pump	4.2	3.0	3.5
B 1700 with 2 pumps	4.2	3.7	4.0

MOTOR SPEED (r.p.m.)

A.C.		D.C.
50 C/S	60 C/S	
1420 - 1500	1700 - 1800	1420 - 1500

If the motor is not supplied by us, it is advisable to consult us or our representative about suitable type etc.

DIRECT DRIVE - FLANGE MOTOR (4-drive)



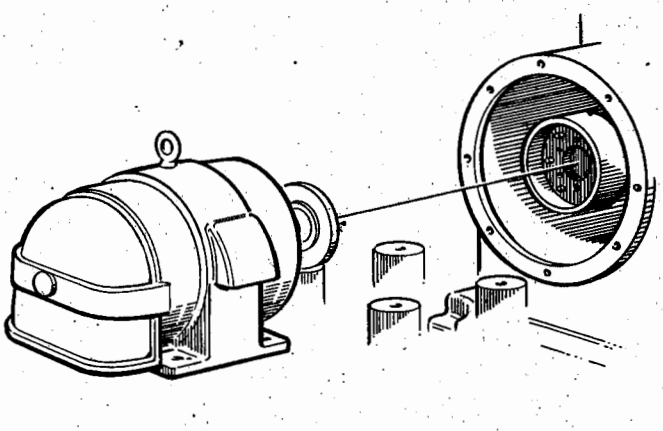
The coupling pulley of the motor is secured in correct position on the motor shaft. This position should be marked by scoring if the pulley has to be loosened from the shaft.

B 1700C

Screw the two accompanying guide bolts into the upper, opposed screw holes in the frame flange.

Hang the motor on the bolts and push it into the right position, fitting the pins of the coupling pulley into the holes of the elastic plate. Screw in the lower screws and replace the guide bolts by screws.

DIRECT DRIVE - MOTOR ON FOUNDATION PLATE (5-drive)



The coupling pulley of the motor is secured in correct position on the motor shaft. This position should be marked by scoring if the pulley has to be loosened from the shaft.

Place the motor on the base blocks and push it into correct position, fitting the pins of the coupling pulley into the holes in the elastic plate. Fix the position of the motor with the guide pins and fasten it with screws.

Motor and foundation plate are marked with the manufacturing number of the separator to which they belong. Remember this when mounting several machines at the same time.

Connect the motor to the electric circuit so that the separator bowl will rotate CLOCKWISE.

Never start the separator without the bowl on the spindle.

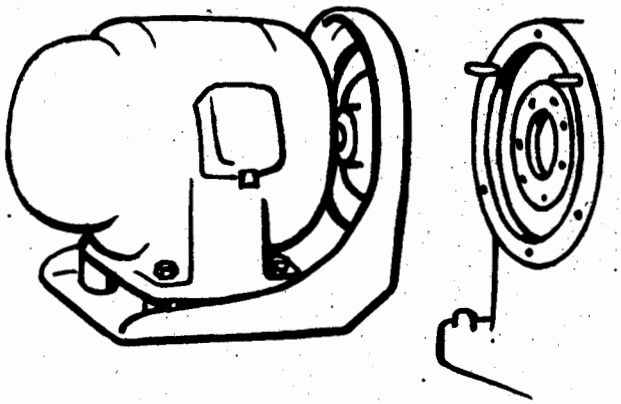
V BELT DRIVE - SEPARATE MOTOR (7-drive)

Place the motor on slide rails. Bring the V belt pulley of the motor into exact alignment with the V belt pulley of the separator and put on the V belts.

The belts should not be tightened more than that they can easily be drawn together 1" (2-3 cm) by hand right between the belt pulleys.

Fasten motor and belt guard.

DIRECT DRIVE - MOTOR ON BRACKET (9-drive)



The coupling pulley of the motor is secured in correct position on the motor shaft. This position should be marked by scoring if the pulley has to be loosened from the shaft.

If the motor is not fastened on the bracket when delivered, place it on the base blocks, fix its position with the guide pins and fasten it with screws.

Motor and bracket are marked with the manufacturing number of the separator to which they belong. Remember this when mounting several machines at the same time.

B 1700C

Screw the two accompanying guide bolts into the upper, opposed screw holes in the frame flange.

Hang bracket with motor on the bolts and push the motor into correct position. Fit the pins of the coupling pulley into the holes in the elastic plate. Screw in the lower screws and replace the guide bolts by screws.

If access is wanted to the coupling pulley or the like, let the motor remain on the bracket and remove both together. Of course, this is possible only provided the motor is not so large that it covers the screws of the bracket.

Connect the motor to the electric circuit so that the separator bowl will rotate CLOCKWISE.

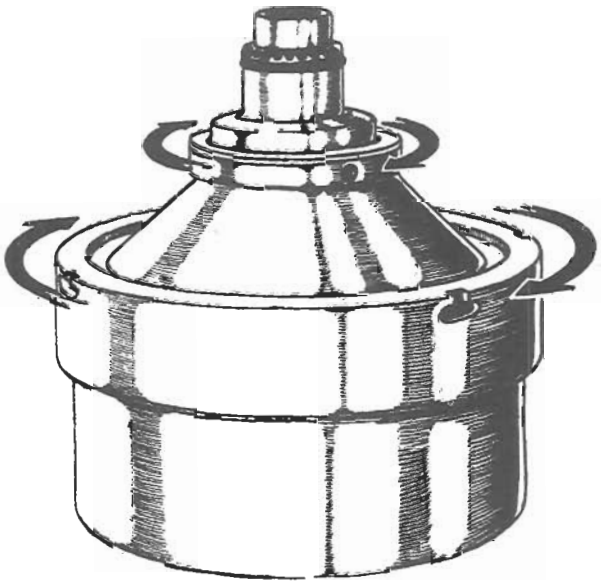
Never start the separator without the bowl on the spindle.

TAKING APART THE SEPARATOR BOWL OUTSIDE THE FRAME (for instance before first use) -. see Fig. SEPARATOR BOWL and TOOLS in PARTS LIST

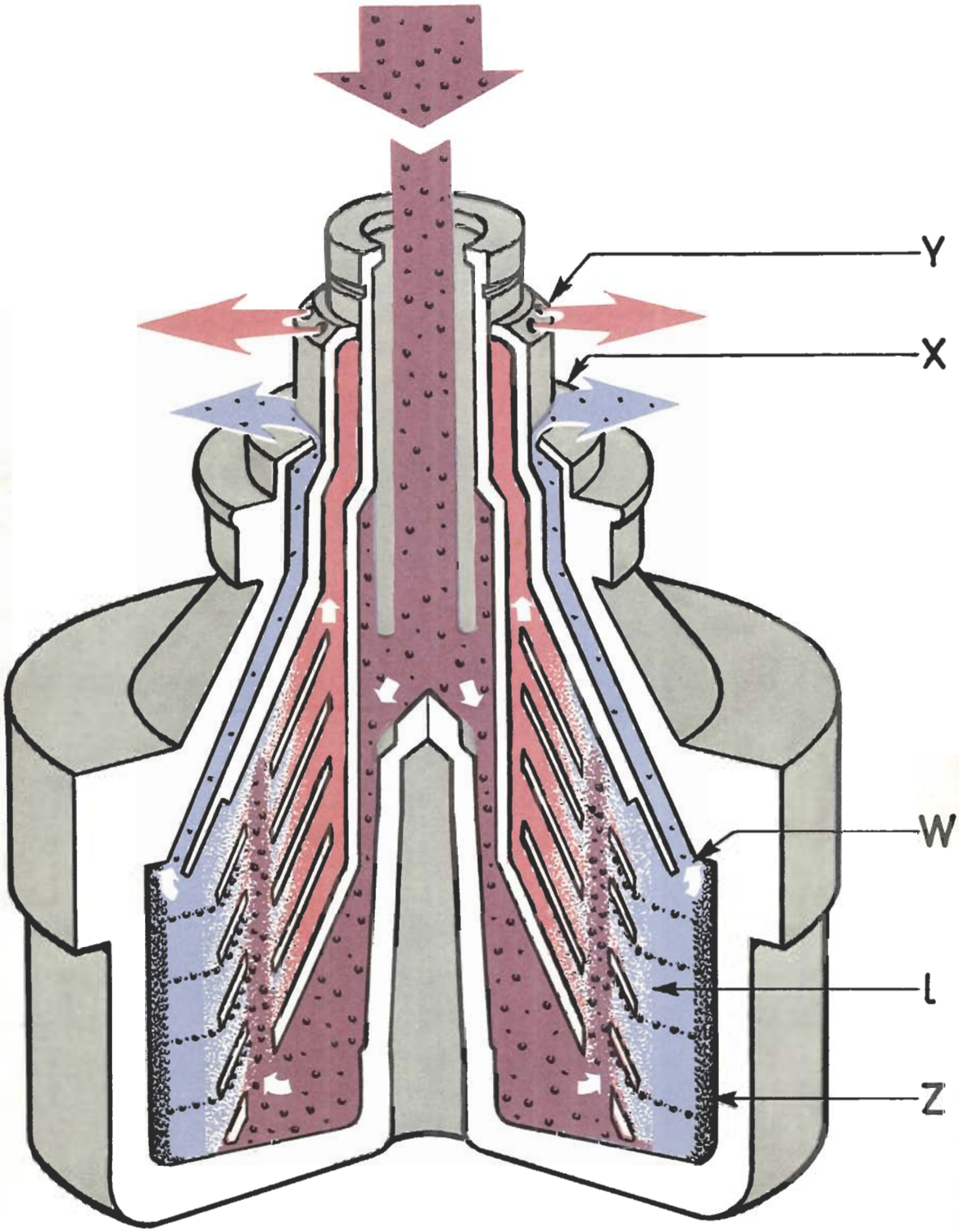
As all parts are not fitted in the bowl at the delivery, the bowl must be taken apart, cleaned and completed before being used.

- Screw off small lock ring CLOCKWISE with spanner V1.
- Screw off large lock ring CLOCKWISE with spanner V3. If necessary knock some times lightly with a tin mallet on the spanner handle.
- Screw lifting screw A1 into the centre hole of distributor and lift up the latter together with disc set and bowl hood.
- The bowl discs are placed on the distributor in their numerical sequence WITH DISC NO. 1 LYING UNDERMOST. Always maintain this order, as otherwise the bowl may get out of balance.

The bowl parts are greased at the delivery and should be cleaned with hot water to which some soda has been added.



Unscrew the lock rings clockwise


Y
X
W
L
Z

SEPARATING METHODS

The separation serves the purpose:

either to separate two liquids insoluble in one another and of different specific gravity, and at the same time separate off heavier, solid impurities - PURIFICATION

or to liberate a liquid principally from solid impurities, any possible small amount of heavier liquid (usually water) in the liquid also being separated off - CLARIFICATION.

PURIFICATION

How to assemble the bowl as a purifier is shown in Fig. SEPARATOR BOWL in PARTS LIST and its function is diagrammatically shown in the coloured illustration. The liquid flow is indicated by arrows. The liquid to be treated is conducted from the distributor through holes that correspond to the inlet holes in the bowl discs. The liquid fed between the bowl discs is divided by centrifugal force into a purified lighter component (generally oil), which flows inward along the top surface of the bowl discs, and a separated-off heavier component (generally water and sludge), which moves along the underside of the discs outward to the sludge space Z.

The purifier bowl has two outlets. Through one of them X the heavier liquid (generally water) is discharged together with some part of the solid impurities, and through the other one Y the lighter liquid (generally oil). In the sludge space Z most of the solid impurities are collected.

Liquid seal

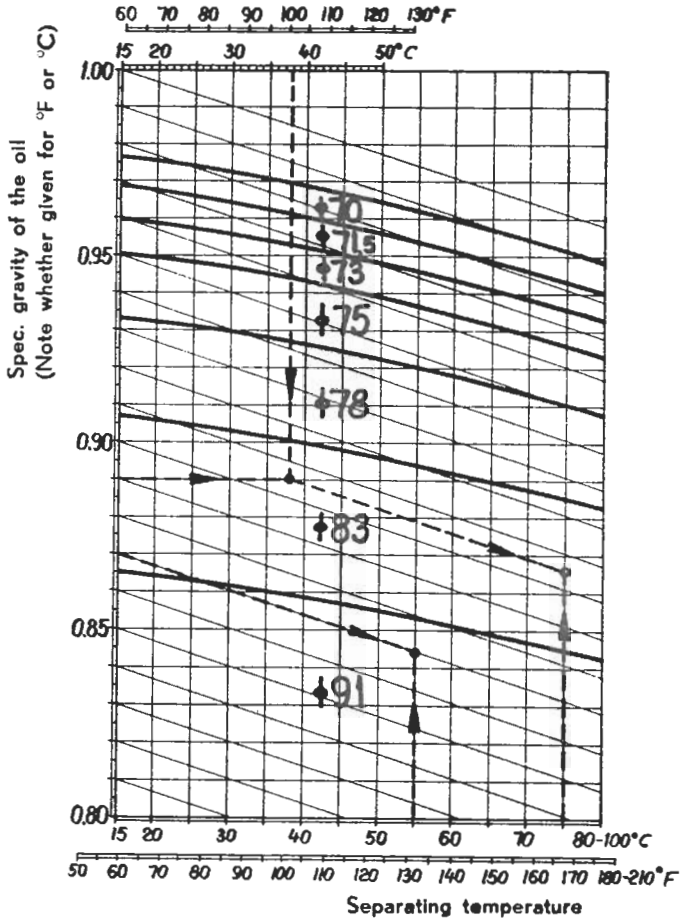
For correct functioning of the bowl it is necessary to provide for a liquid seal in the sludge space Z before admitting the liquid to be treated. This is usually done by filling the bowl, as soon as it has attained its full speed, with the heavier liquid (generally water) preferably with the same temperature as the liquid to be treated.

When the liquid to be separated (generally contaminated oil) is supplied, this liquid will dislocate the water to a certain interface "1". Its position is dependent on the ratio between the specific gravities of the lighter and the heavier liquid component.

Selecting the gravity disc

The purifier bowl can be adjusted to separate liquid mixtures with different ratios of specific gravity by modifying the size (diameter) of the outlet X for the heavier liquid.

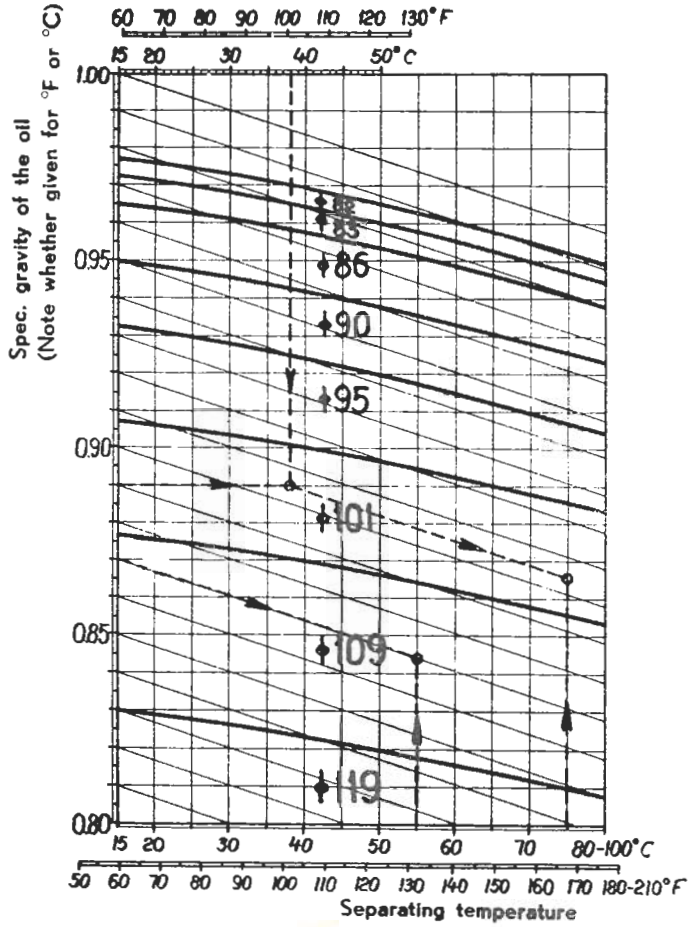
For this purpose, each separator is supplied with a number of gravity discs with holes of different diameter. On each disc its hole diameter is given in millimeters. The table on page 13 indicates the disc that should first be tried at the separating temperatures 130° F and 176-212° F (55° and 80-100° C) when the specific gravity of the oil at 60° F (15° C) is known. If the specific gravity of the oil is known at some other temperature between 60-122° F (15-50° C) it is possible to find out from the diagram the gravity disc that should first be tried at separating temperatures up to 212° F (100° C).



B 1500

Ex. 1 Spec. gravity of oil: 0.87 at 60°F (15°C), sep. temp. 130°F (55°C): Gravity disc ø 91 mm

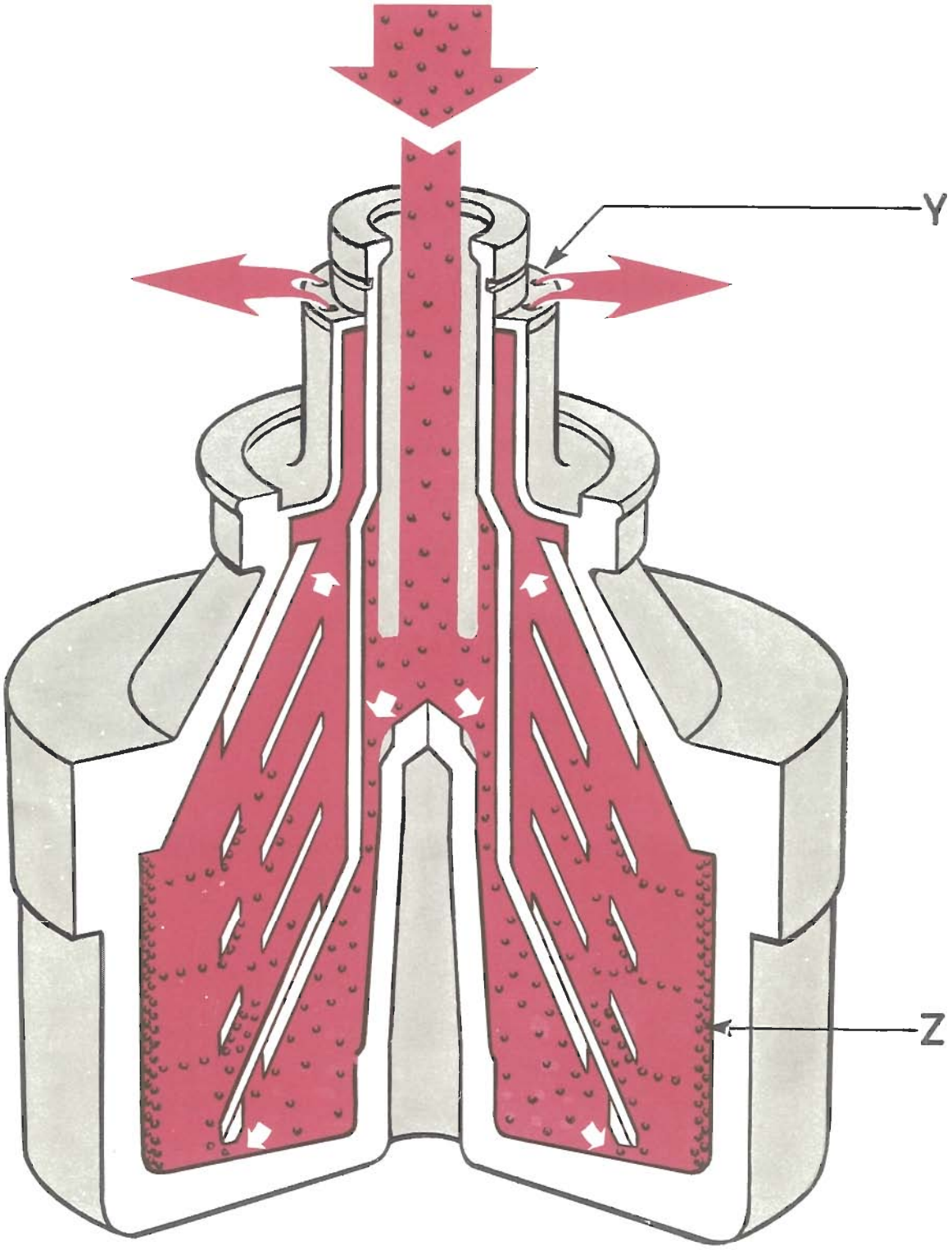
Ex. 2 Spec. gravity of oil: 0.89 at 100°F (38°C), sep. temp. 168°F (75°C): Gravity disc ø 83 mm



B 1700

Ex. 1 Spec. gravity of oil: 0.87 at 60°F (15°C), sep. temp. 130°F (55°C): Gravity disc ø 109 mm

Ex. 2 Spec. gravity of oil: 0.89 at 100°F (38°C), sep. temp. 168°F (75°C): Gravity disc ø 101 mm


Y
Z

B 1500

Gravity disc Ø mm	Specific gravity of oil at 60° F (15° C)	
	Separating temperature = 130° F (55° C)	Separating temperature = 176-212° F (80-100° C)
70.0	0.988 - 0,980	0.991 - 0.983
71.5	C.980 - 0.971	0.983 - 0.975
73.0	0.971 - 0.963	0.975 - 0.965
75.0	0.963 - 0.946	0.965 - 0.950
78.0	0.946 - 0.920	0.950 - 0.925
83.0	0.920 - 0.880	0.925 - 0.885
91.0	0.880 - 0.835	0.885 - 0.840

B 1700

Gravity disc Ø mm	Specific gravity of oil at 60° F (15° C)	
	Separating temperature = 130° F (55° C)	Separating temperature = 176-212° F (80-100° C)
82.0	0.988 - 0.984	0.991 - 0.987
83.0	0.984 - 0.977	0.987 - 0.980
86.0	0.977 - 0.962	0.980 - 0.965
90.0	0.962 - 0.943	0.965 - 0.947
95.0	0.943 - 0.920	0.947 - 0.925
101.0	0.920 - 0.890	0.925 - 0.895
109.0	0.890 - 0.844	0.895 - 0.850
119.0	0.844 - 0.794	0.850 - 0.800

Generally speaking, the best result is obtained by using a disc with a hole of the largest size possible without the liquid seal in the bowl being broken. The interface "1" between the two liquid components must not come so far out toward the periphery of the bowl that it lies outside the outer edge W of the top disc. Should this be the case, the lighter component will discharge via the outer edge of the top disc together with the heavier one (the liquid seal breaks).

CLARIFICATION

How to assemble the bowl as a clarifier is shown in Fig. SEPARATOR BOWL in PARTS LIST and its function is diagrammatically shown in the coloured illustration, where the liquid flow through the bowl is indicated by arrows.

In the space between the bowl discs the clarifying is carried out through the action of the centrifugal force in such a way that the lighter liquid during its passage toward the bowl centre gets liberated from the "sludge" (heavier solid impurities and any heavier liquid).

The clarified liquid continues its passage in the axial direction upward and is discharged through the bowl outlet Y. The "sludge" slides along the bottom face of the discs out into the sludge space Z, where it is deposited against the bowl wall.

ASSEMBLING SEPARATOR BOWL - see Fig. SEPARATOR FRAME, SEPARATOR BOWL, BOWL LIFTING DEVICE and TOOLS in PARTS LIST.

If two or more separators of the same size are used, the operator should be careful not to mix up the parts of the different bowls, as each bowl has been balanced individually. If a bowl is assembled with parts belonging to different separators, there is the risk of the separator vibrating. To avoid any confusion the main parts of each bowl have been stamped with the same number.

o Check that the nave bore in bowl body is clean.

Wipe off the top part of bowl spindle and apply a little oil or grease.

o Screw lifting screw plug V2 into the bowl nave. Put the large drift through the hole in the plug and place bowl body carefully on bowl spindle.

Turn bowl body so as to bring the recess in its upper rim right in front of one of the lock screws and lock bowl body with the screws (Note: tighten both of them).

o Slip packing over cap nut.

Lock the bowl body with the cap nut, which should be firmly tightened.

o FOR PURIFICATION:

Slip bowl discs over distributor in their numerical sequence, starting with disc No. 1.

Put on top disc C11.

o FOR CLARIFICATION:

Slip bottom disc C14 (without inlet holes) over distributor.

Slip on bowl discs in their numerical sequence, starting with disc No. 2.

Put on top disc C13.

Note: The top disc is provided with three grooves, which should be fitted over the corresponding ribs of the distributor.

o Slip strainer ring C8 over the nave of the bowl body.

o With lifting screw A1 place the distributor with discs in bowl body, fitting the recess in the lower side of the distributor over the guide pin of the bowl body. To do this, turn distributor until guide pin enters recess.

o Put large rubber ring into the groove in bowl body.

o Put on bowl hood in such a way that its guide lug enters the notch in bowl body.

Note: If the bowl hood does not fit in its proper position, do not force it down (for instance by screwing on the lock ring), but examine whether all parts have been correctly fitted.

o Lubricate large lock ring on the inside with consistent grease[x]. Screw it on and tighten ANTI-CLOCKWISE with spanner V3, until marks ◊ on lock ring and hood are right opposite each other as shown on illustration.

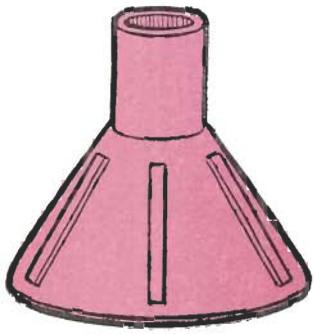
x) If bowl body, bowl hood or lock ring is made of stainless steel use castor oil.

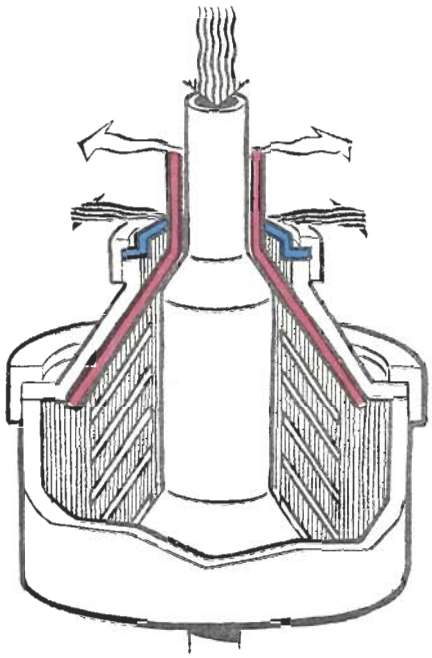
DE LAVAL

PURIFIKATOR
PURIFIER
PURIFICATEUR
PURIFICADORA

REGLERINGSBRICKA
GRAVITY DISC
DISQUE DE RÉGLAGE
REGULIERSCHEIBE
DISCO REGULADOR
DISCO DE DENSIDADE

ÖVERPLÄT MED HALS
TOP DISC WITH NECK
DISQUE SUPÉRIEUR AVEC COL
OBERTELLER MIT HALS
PLATO SUPERIOR CON CUELLO
DISCO SUPERIOR COM GARGALO

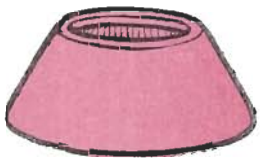




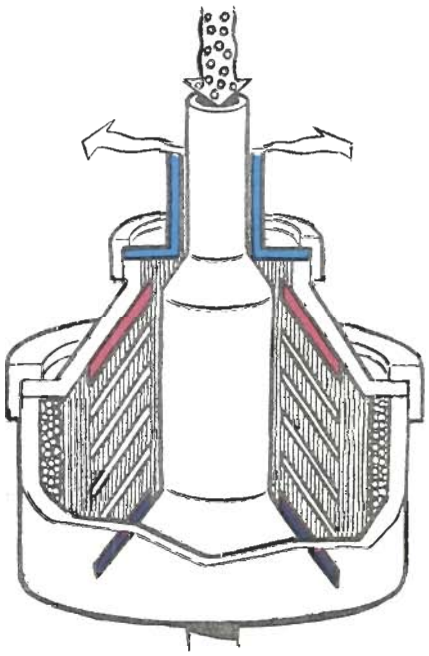
KLARIFIKATOR
CLARIFIER
CLARIFICATEUR
CLARIFICADORA

UTLOPPSHALS
DISCHARGE COLLAR
COL DE DÉCHARGE
AUSLAUFHALS
CUELLO DE SALIDA
COLAR DE DESCARGA

ÖVERPLÄT UTAN HALS
TOP DISC WITHOUT NECK
DISQUE SUPÉRIEUR SANS COL
OBERTELLER OHNE HALS
PLATO SUPERIOR SIN CUELLO
DISCO SUPERIOR SEM GARGALO



UNDERPLÄT UTAN HÄL
BOTTOM DISC WITHOUT HOLES
DISQUE INFÉRIEUR SANS TROUS
UNTERTELLER OHNE LÖCHER
PLATO INFERIOR SIN AGUJEROS
DISCO INFERIOR SEM FUROS



The final tightening is more easily done by knocking on the spanner handle with a tin mallet.

- Put small rubber ring in the groove in bowl hood.

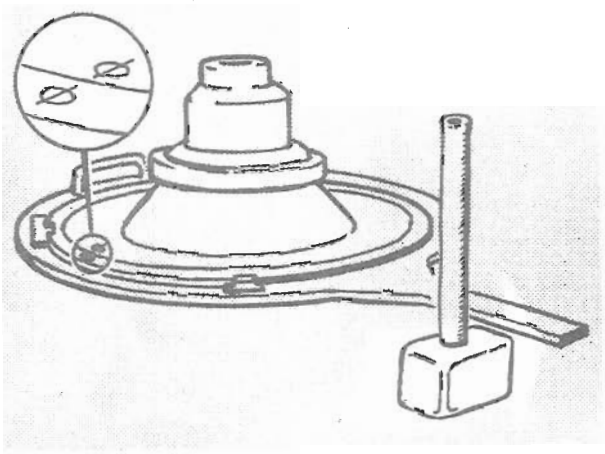
- FOR PURIFICATION:

  Place the selected gravity disc C10 on bowl hood.

- FOR CLARIFICATION:

  Place discharge collar C12 on bowl hood.

- Lubricate small lock ring on the inside with consistent grease x).



- Screw on the ring and tighten ANTI-CLOCKWISE with spanner V1 until it seals tightly.

- Loosen the two lock screws and check that the bowl can rotate freely.

x) If bowl body, bowl hood or lock ring is made of stainless steel use castor oil.

NEVER start the separator unless the worm gear housing contains oil of prescribed quality and quantity.

Lubricating oil

Use a high grade motor oil SAE 40, "Service ML" (Regular oil) or "Service MM" or "Service MS" (Premium Type), with a viscosity of 70-85 SUS at 210°F, corresponding to 2.12-2.52°E at 99°C. Viscosity index minimum 85.

Oil filling

Pour oil into the worm gear housing through the filling hole in the worm wheel guard until the oil level is somewhat above the middle of the gauge glass.

Oil level

Never let the oil level sink below the lower edge of the gauge glass.

Oil gauge glass

Keep the gauge glass clean - impurities on the inside of the glass could otherwise be mistaken for the oil level.

Oil strainer

The strainer for the lubricating oil should be cleaned at least each time the oil is changed.

Oil checking

From time to time back off the drain screw some turns and draw an oil sample from the worm gear housing. This should be done immediately after the separator has stopped. If the oil turns out to be contaminated drain it off and pour in fresh oil.

Oil change

Exchange the oil the first time after about 300 working hours and then after each operating period of about 800 hours.

When changing the oil clean the worm gear housing with kerosene. Use a smooth cloth (not twist).

Bearings of bowl spindle

The bowl spindle bearings are lubricated continuously by the lubricating pump. During operation check from time to time that oil flows through the lubricating oil indicator.

Bowl spindle top

If the separator is to stand idle for several days, the bowl body should be removed from the bowl spindle. Apply some oil or grease to the spindle top.

Worm wheel shaft

Once or twice a year fill the nave of the coupling pulley to one third with ball bearing grease.

Bowl lock rings

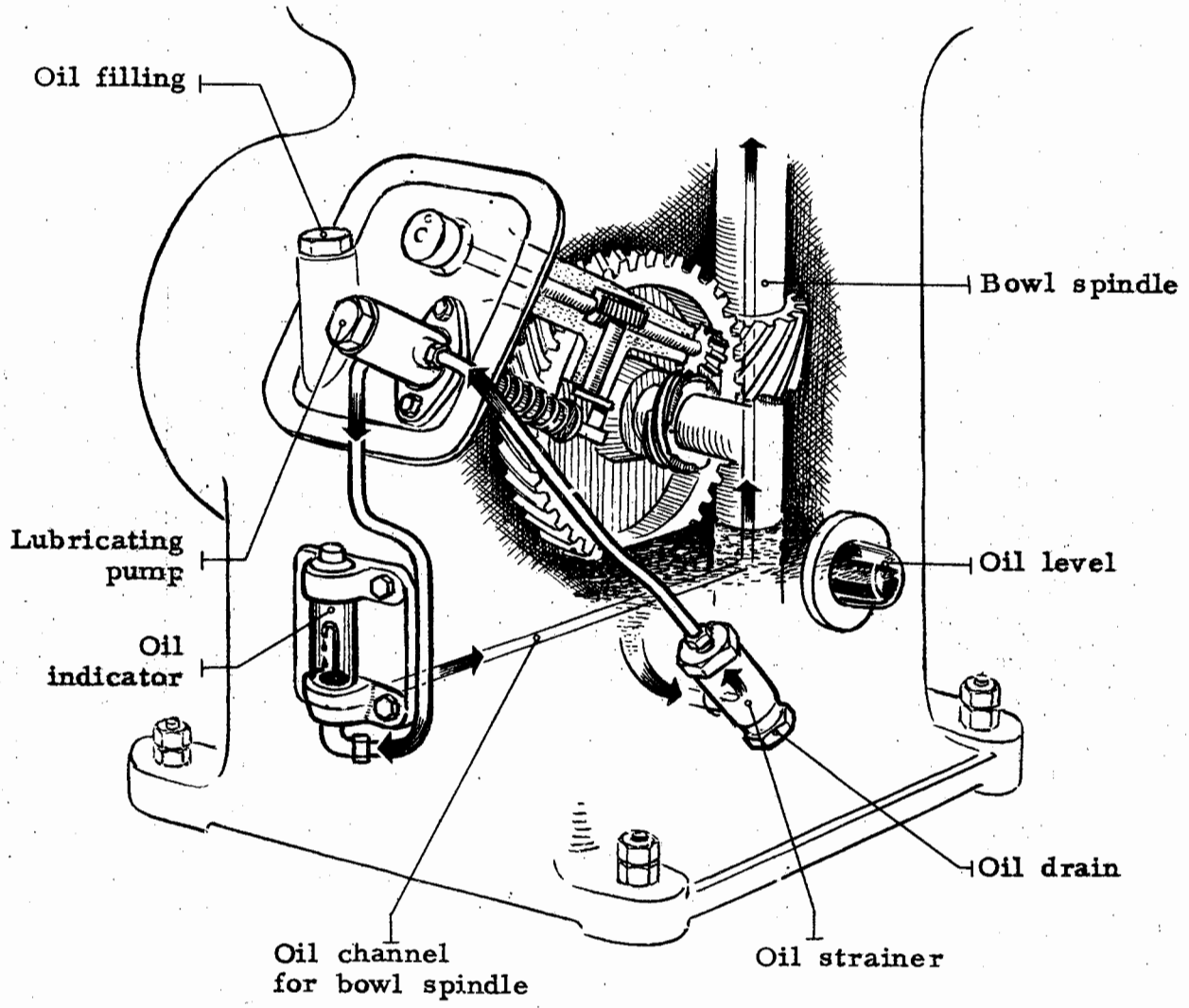
When assembling the separator bowl lubricate the inside of the lock rings with consistent grease. If bowl body, bowl hood or lock rings are made of stainless steel, use castor oil.

V belt drive

Screw in the grease cup a quarter revolution. At the same time check that the cup contains consistent grease.

Pump for liquid to be treated

When the separator is equipped with pump for the liquid to be treated and the latter contains only inferior quantities of oil, the grease cups of the pumps should be tightened a quarter of a turn from time to time. Use consistent grease as lubricant.


Oil filling
Bowl spindle
Lubricating pump
Oil level
Oil indicator
Oil drain
Oil channel for bowl spindle
Oil strainer

OPERATION

Before starting check:

that rubber rings for frame hood in Fig. SEPARATOR FRAME in PARTS LIST are in their grooves

that frame hood is locked

that both lock screws are sufficiently loosened to allow free rotation of the bowl

that the brake is released

that the oil level is somewhat above the middle of the gauge glasses.

NUMBER OF REVOLUTIONS:

The worm wheel shaft should turn at 1420 - 1500 r.p.m. at 50 C/S and 1700 - 1800 r.p.m. at 60 C/S.

Now and then check the number of revolutions by means of the revolution counter, which should turn at 79 - 83 r.p.m. at 50 C/S and 95 - 100 r.p.m. at 60 C/S.

If D.C. MOTORS are used note that their speed is 5-7% below the nominal figure in the beginning and that the speed will also decrease at potential drops.

PURIFICATION:

Providing the liquid seal:

When the separator bowl is about to attain its full number of revolutions (3 minutes after starting at the earliest) screw out the plug on top of the frame hood and pour in water or admit water through a conduit connected to the feed pipe. This should be done quickly. When water begins to flow out through the water outlet, turn off the supply.

Supplying the liquid to be separated:

With the liquid seal provided, the liquid to be treated can be admitted. The valve in the feed line should be opened SLOWLY, as otherwise the liquid seal may break.

CLARIFICATION:

As soon as the bowl has run up to full speed let on the liquid to be treated. The supply should be as large as possible so that the bowl is filled QUICKLY.

WHEN THE SEPARATOR IS TO BE STOPPED

turn off the liquid feed, switch off the motor and apply the brake.

The liquid left in the bowl will run out automatically when the bowl stops.

NEVER RAISE THE FRAME HOOD UNTIL THE BOWL HAS STOPPED

Release the brake.

NOTE:

- Soon after starting up it may occur that the bowl vibrates, which is generally caused by its having come out of balance owing to bad cleaning after previous running. If the vibrations of the bowl become violent, the machine should be stopped and the bowl cleaned.
- If DURING SEPARATION liquid runs out through the waste liquid tube in the bowl casing, this signifies that one of the rubber rings in the bowl does not seal. In such a case, shut down the separator immediately and exchange the defective ring.
- During the running-up period, some heat is always generated in the friction coupling and this is often indicated by a certain amount of smoke. This is quite normal and without any importance. However, if smoke is generated during normal operation, the machine should be shut down for inspection.

SEPARATING TEMPERATURE. A high separating temperature is generally favourable. The temperature should be kept uniform throughout the separation.

Example:

	°C	°F
Lubricating oils		
straight mineral type, about	80	180
detergent type	80-90	180-190
Diesel fuel oil about	40	104
High viscosity fuel oil	80-90	180-190

WASHING WITH HOT WATER. This method is used only with the separator arranged as a PURIFIER, that is with two liquid outlets.

Through the water admixture is obtained

- that acid components are washed out of the oil
- that the water forming the liquid seal is renewed
- that some of the separated-off sludge is continuously discharged

WATER QUANTITY AND TEMPERATURE

Quantity:

when separating straight mineral type lubricating oil - 3-5% of the oil quantity

when separating detergent type lubricating oil (HD-oil) - MAX. 1% of the oil quantity.

Temperature:

about 10°F (5°C) above the separating temperature.

NOTE

- the method of "washing" the oil with hot water is applicable to most detergent type oils (HD-oils). However, it is best to ask the oil supplier
- if the detergent type oil (HD-oil) is not suited for admixture of water, renew the liquid seal in the purifier AT LEAST every 6th hour
- if CONTINUOUS water admixture cannot be arranged, provide for intermittent water admixture (about half an hour each time)
- under all circumstances renew the liquid seal AT LEAST every 24 hours.

CLEANING

Every time the separator is shut down the bowl should be taken apart and cleaned before the separator is started again, and this is even if the sludge space is not entirely filled.

Sludge separated from lubricating oil or high viscosity fuel oil is often corrosive due to its content of acids and salts - clean the separator bowl immediately after separation.

SEPARATING RESULTS NOT UP TO STANDARD:

Possible cause of trouble	Remedy
Unsuitable gravity disc (at purification)	Follow directions in SEPARATING METHODS.
The speed is too low	Inspect pads on friction clutches. Wash off oil or grease with for instance trichlorethylene. Roughen up pad faces with a coarse file. If the pads are worn, exchange both of them at the same time.
Unsuitable temperature of the liquid to be treated	A high separating temperature is generally advantageous. The temperature should be kept uniform throughout the separation.
Too great a liquid feed (throughput)	
The sludge space in the bowl is filled	Stop separator for cleaning before bowl is completely clogged with sludge.
Emulsion or formation of froth in the liquid to be treated	Reduce the feed. Raise the temperature if possible.

CONSIDERABLE QUANTITIES OF THE LIGHTER LIQUID DISCHARGE DURING PURIFICATION TOGETHER WITH THE HEAVIER LIQUID THROUGH THE DISCHARGE SPOUT:

Possible cause of trouble	Remedy
Broken liquid seal	Check: that a sufficient quantity of heavier liquid (water) is filled in; that the rubber rings of the bowl seal; that the hole diameter of the gravity disc is not too large.
The separating temperature has changed and thus also the ratio between the spec. gravities of the liquid components	Try another gravity disc

THE PUMP DOES NOT SUCK OR ITS OUTPUT IS TOO LOW - see Fig. FEED AND DISCHARGE PUMPS in PARTS LIST

Possible cause of trouble	Remedy
The pump is dry	When working with air only the suction of the pump might be insufficient to lift the liquid the required height. Prime pump before starting.
Leak in suction pipe, packing box or grease cup	If grease cup is used, ascertain that it is always filled with consistent grease, as otherwise the pump will suck air through the cup.
Leaking valve	Compress the relief valve spring. Check that there are no impurities between valve cone and seat.
Broken shearing pin F8	Exchange the shearing pin.
Strainer or pipe lines are clogged	Clean more frequently.

BAD RUNNING:

Possible cause of trouble	Remedy
The nuts for the anchor bolts of the frame are tightened too much or too little	See directions in MOUNTING THE SEPARATOR.
The elasticity of the rubber cushions has decreased	The cushions should be exchanged every second year.
The pressure in the set of discs is insufficient	In time, the pressure in the disc set between distributor and hood will decrease. The discs will then not be steady even though large lock ring has been tightened until marks ◊ are right opposite each other. To check the pressure, tighten bowl without large rubber ring being inserted. If by means of the spanner the large lock ring can now be easily tightened until marks ◊ are in line, insert the extra bowl disc (without sequence number) immediately beneath top disc.
The bowl is wrongly assembled or insufficiently cleaned	See directions in ASSEMBLING THE SEPARATOR BOWL.
Worn worm or worm wheel Damaged spindle top Damaged ball bearings	If a "grinding" sound is heard, some ball bearing is damaged or worn and should be exchanged.
In case of serious damage, which necessitates a re-balancing of the bowl, the complete bowl must be sent to us for repairs.	

Learn by experience how often the bowl should be cleaned. This depends on the sludge content in the liquid to be treated and the throughput (i.e. quantity of treated liquid per hour).

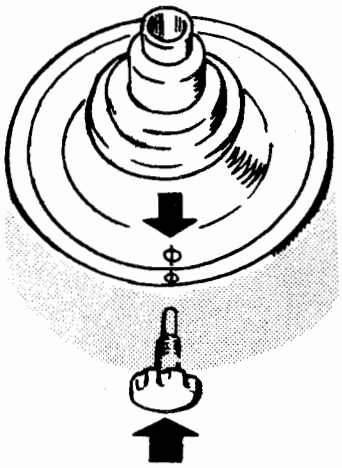
Do not put off the opening of the bowl until the sludge space is completely filled up, as in such a case sludge will also begin to fill the space between the bowl discs, impairing the result of the separation and making the cleaning more difficult.

If liquid flows against the sight glass in top part of frame hood, this signifies that the bowl is clogged up and has thus been run for too long a time.

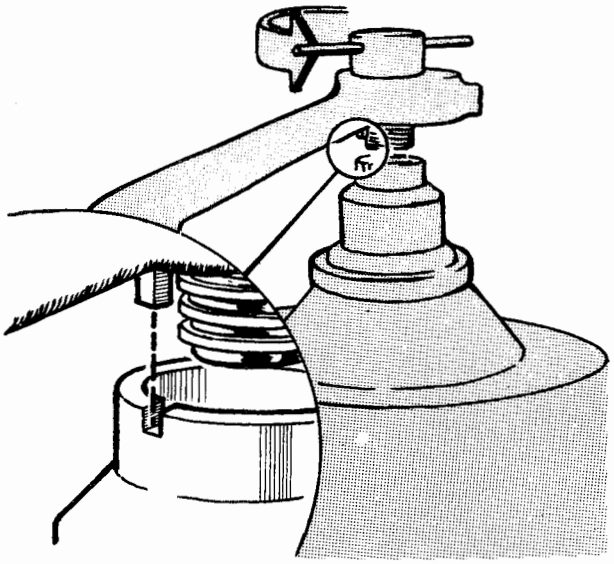
Do not raise the frame hood until the bowl has stopped.

Lock the bowl with BOTH screws. The lock screws will enter the holes in the bowl body if the bowl is turned in such a way that the mark ◊ on the bowl hood comes right in front of one of the lock screws.

Unscrew the large lock ring CLOCKWISE by means of the spanner and tin mallet.



When using the lifting device, move the turnable arm over the distributor and screw the lifting screw ANTI-CLOCKWISE into the distributor. The guide pin of the turnable arm should enter the recess in top rim of distributor.



Lift the distributor with attaching parts out of the bowl body and swing the turnable arm outside the separator.

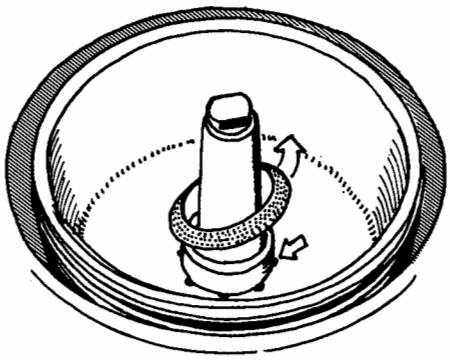
Remove all sludge from bowl body with sludge scoop and sludge knife.

Clean the channels on the upper face of the top disc.

Cleaning may be made easier if a liner of plastic-coated paper is put into the bowl body. Cut out paper of a suitable length; wet the plastic-treated side with water and put it against the inside of the bowl body so that the ends overlap.

When cleaning, remove the paper and dirt together.

For the part number of one roll of sludge-catching paper see PARTS LIST under SPARE PARTS.



Lift the strainer ring and clean the drain channels.

Remove all sludge from the lower side of the bowl hood.

If the sludge does not stick, the disc set can normally be cleaned by "throwing". With the other bowl parts cleaned, assemble the bowl again with the set of discs in its present condition. Run up the separator to full speed with EMPTY bowl, i.e. without feeding liquid to it, whereby the sludge is thrown off the discs and into the sludge space. Then either open the bowl and remove the sludge or continue the separation directly noting the directions given under "OPERATION".

If the sludge sticks firmly, first dissolve it by submerging distributor and disc set in some suitable liquid. If the disc set still cannot be cleaned by "throwing", each individual disc must be cleaned with a brush or the DE LAVAL brushing machine must be used.

If the liquid to be treated contains brine or other corrosive substances, the bowl parts must be cleaned with special care after separation.

Special care must be taken in cleaning the bowl also if the separator is to stand idle for some length of time.

Separator frame

Clean the bowl casing now and then with a cloth or a brush, using a minimum of washing liquid. When cleaning, neither pour liquid into the bowl casing nor rinse it, as liquid might then enter the gear housing.

PERIODICAL CLEANING

Once a year

Remove the bowl spindle from the frame and take it apart according to the instructions given under BOWL SPINDLE. Clean the various parts with kerosene. See that the lubricating channel in the bowl spindle is clean.

Clean the parts of the friction coupling. Wash the pads of the friction clutches and the friction face of the conveyor pulley with trichlorethylene or some other fat solvent and roughen up the friction face of the pads with a coarse file. If the pads are worn, exchange all of them at a time.

Clean the ball bearings in the coupling pulley nave. Wash them in kerosene and then rinse with oil. Fill the nave to about one third with ball bearing grease before assembling.

GENERAL INFORMATION ON BALL BEARINGS

Do not remove new bearings from their wrappers until ready to fit.

Do not clean out grease in which bearings are packed. It is important to leave the grease untouched.

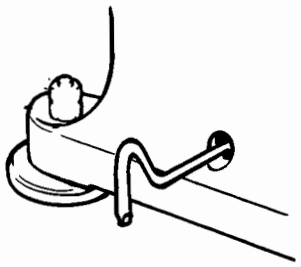
Ball bearings should never be forced on to a shaft by blows applied to the outer race, nor into a housing by pounding upon the inner race.

When a bearing is expanded by being heated in oil, the temperature of the oil should not exceed 180° F (80° C) and the bearing should not be kept in the bath longer than necessary to bring the entire bearing to the required temperature.

When bearings after some length of time have been removed and are to be used again, they should be thoroughly washed in CLEAN kerosene and re-oiled before assembly.

BOWL SPINDLE

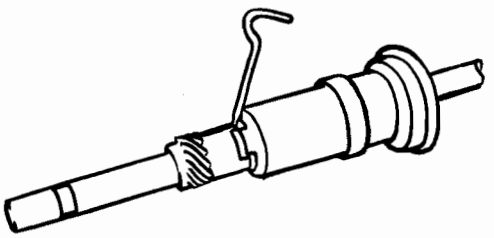
Screw out the lock screw.



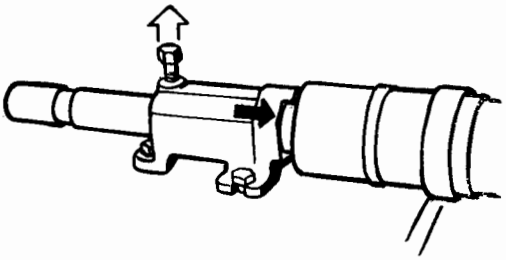
Lift the spindle straight up from the frame.

Draw the worm together with the interlining ring and elastic steel ring off the outer sleeve, turning the worm in such a way that the three small projections will be disengaged.

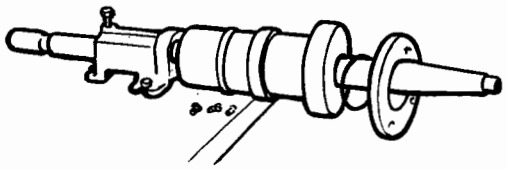
If the worm cannot be pulled off with the hand, push it off with a screw driver.



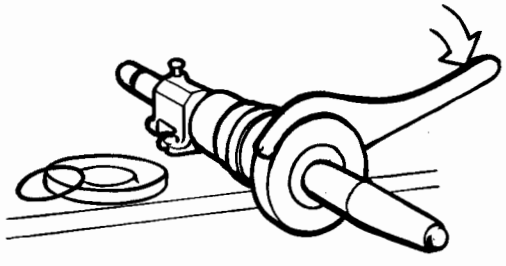
Secure the bowl spindle in the holder in such a position that the lug of the holder enters one of the recesses in the outer sleeve.



Screw out the four fixing screws. Remove the gland and the rubber ring.



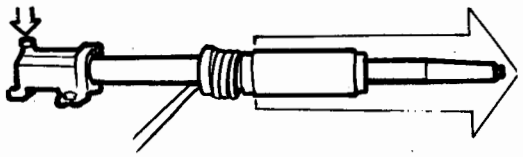
Unscrew the lock nut in the direction indicated by the arrow (clockwise).



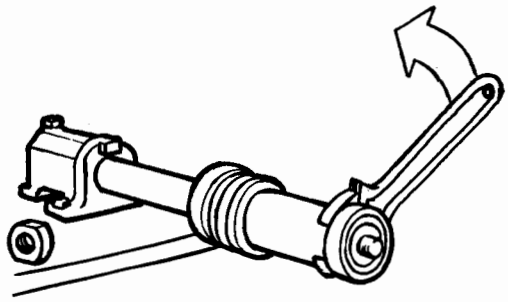
Take the centre rod out of the outer sleeve. To do this, loosen the spindle from the holder, take hold of the outer sleeve and tap the end of the centre rod against a wooden object.

Secure the centre rod in the holder, whose screw should be screwed into the hole in the centre rod.

Draw off the spindle sleeve and remove the upper spring.



Screw off lock nut and inner sleeve. Remove upper ball bearing, lower spring and lower ball bearing.



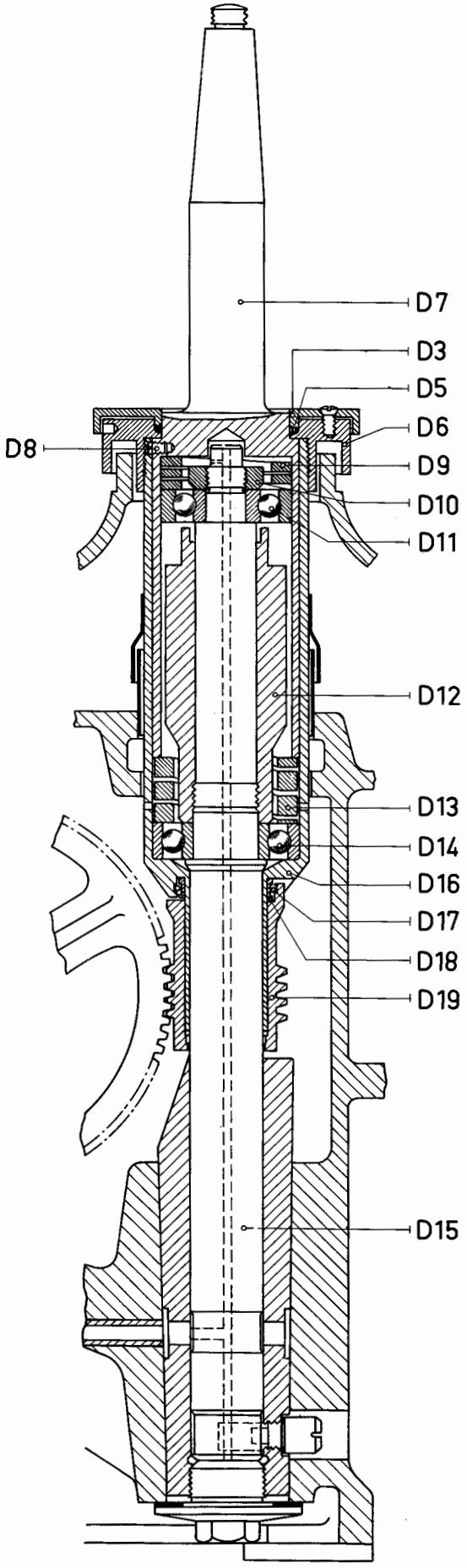
LEGEND

D3	Gland
D5	Rubber ring
D6	Lock nut
D7	Spindle sleeve
D8	Guide screw
D9	Spring
D10	Lock nut
D11	Ball bearing
D12	Inner sleeve
D13	Spring
D14	Ball bearing
D15	Centre rod
D16	Outer sleeve
D17	Elastic steel ring
D18	Interlining ring
D19	Worm

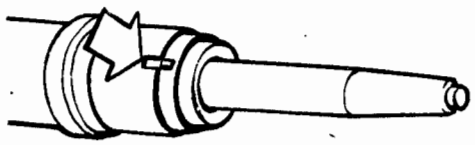
ASSEMBLING BOWL SPINDLE:

First clean and oil the parts carefully and then assemble them in reverse order.

Thus first secure the centre rod in the holder and slip on lower ball bearing, lower spring, inner sleeve, upper ball bearing and lock nut. Tighten inner sleeve and lock nut firmly.


D7
D3
D5
D6
D8
D9
D10
D11
D12
D13
D14
D16
D17
D18
D19
D15

Take the centre rod with its parts out of the holder and push it into the outer sleeve. Oil the spindle sleeve on the outside. Then hold the spindle vertically, place the upper spring on the ball bearing and put spindle sleeve into outer sleeve, taking care that the guide



lug on spindle sleeve fits into the corresponding slot in the upper edge of outer sleeve.

Place the spindle in the holder. Screw on the lock nut ANTI-CLOCKWISE and tighten it firmly with the spanner. Put the rubber ring in its place in the lock nut and screw on the gland. Slip the worm over the outer sleeve. If the interlining ring and the elastic steel ring have been removed, the steel ring should first be inserted in the groove on the inside of the three projections of the worm. Then the interlining ring should be pressed down.

Check that the spindle sleeve is axially movable by carefully tapping the spindle top against a suitable object, such as a wooden block.

Insert the bowl spindle in the frame, taking care that the hole in the lower end of the centre rod comes right in front of the stop screw in the bottom bushing.

Screw in the stop screw with its packing and tighten it firmly.

If the bottom screw has been removed, any washers originally inserted between the bottom screw and the end of the centre rod should be put back into their places, as the height of the bowl in the frame depends thereon.

If spindle sleeve or outer sleeve need replacing, send in the complete bowl spindle to our repair shop.

REVOLUTION COUNTER

When checking or exchanging parts always remove the worm wheel guard.

See Fig. WORM WHEEL SHAFT and TOOLS in PARTS LIST

MOTOR AND FRICTION COUPLING

Screw out the two upper opposed screws for motor adaptor and - for type B 1704 - replace them with the guide bolts. Screw out the lower fixing screws for the motor, which is removed together with adaptor. Remove elastical plate.

Unscrew fixing screws and remove protecting cover E3. Bend the lips of lock washer out of the recesses in round nut E4 and screw off the latter with pin spanner V9. Draw off coupling pulley.

See that friction clutches E8 are fitted with the arrows on them pointing in the direction of rotation and that they are locked with washers and split pins.

Fill the nave to about one third with ball bearing grease when assembling. Check that sealing ring has no defects. Do not forget to secure the round nut with lock washer.

The motor with adaptor is to be mounted according to instructions in MOUNTING THE MOTOR.

WORM WHEEL SHAFT WITH WORM WHEEL AND BALL BEARINGS

Remove motor and friction coupling as described above.

Drain off the oil from the gear housing.

FOR PUMP DRIVE: Disconnect pipe lines to and from the pump. Screw out fixing screws for the pump adaptor and remove the latter as well as the pump (pumps). Drive out shearing pin F8 and draw pinion off the shaft.

If the separator is not arranged for pump drive, remove protecting cover E17.

Put screw driver V13 through one of the holes in conveyor pulley E7 and screw out fixing screws for protecting cover E13. Remove worm wheel guard and drive out the conical pins for worm wheel and ball bearing sleeve respectively.

Pull the worm wheel shaft out of the frame, taking care that worm wheel or ball bearing E15 does not fall down and get damaged.

To exchange "fixed" ball bearing E12, screw three 3/8" screws into the threaded holes in the conveyor pulley and tighten them against protecting cover until the bearing is pressed loose. Heat the new bearing in oil to a temperature of 160-175° F (70-80° C) and drive it on to the shaft until it comes to rest against the conveyor pulley. NOTE: The protecting cover E13 with packing must first be slipped on to the shaft.

Before assembling, clean the parts of the worm wheel shaft with kerosene and wipe off the gear housing with a non-fluffy rag. See that ball bearings E12 and E15 have no defects and are well cleaned. Immerse them in oil before insertion.

FILL OIL INTO THE GEAR HOUSING.

See Fig. WORM WHEEL SHAFT and TOOLS in PARTS LIST

MOTOR AND FRICTION COUPLING

Remove protective shield M3. Unscrew the two upper, opposed fixing screws for motor bracket and - for type B 1709 - replace them with the guide bolts. (If the screws are not accessible, the motor must be removed. In this case take care not to displace the base blocks for the motor.) Screw out the other fixing screws for the bracket and lift it off with the motor remaining in its place. Remove the elastical plate.

Unscrew fixing screws and remove protecting cover E3. Bend the lips of lock washer out of the recesses in round nut E4 and screw off the latter with pin spanner V9. Draw off coupling pulley.

See that friction clutches E8 are fitted with the arrows on them pointing in the direction of rotation and that they are locked with washers and split pins.

Fill the nave to about one third with ball bearing grease when assembling. Check that sealing ring has no defects. Do not forget to secure the round nut with lock washer.

Mount the motor bracket with motor as directed in MOUNTING THE MOTOR.

WORM WHEEL SHAFT WITH WORM WHEEL AND BALL BEARINGS

Remove motor and friction coupling as described above.

Drain off the oil from the gear housing.

FOR PUMP DRIVE: Disconnect pipe lines to and from the pump. Screw out fixing screws for the pump adaptor and remove the latter as well as the pump (pumps). Drive out shearing pin F8 and draw pinion off the shaft.

If the separator is not arranged for pump drive, remove protecting cover E17.

Put screw driver V13 through one of the holes in conveyor pulley E7 and screw out fixing screws for protecting cover E13. Remove worm wheel guard and drive out the conical pins for worm wheel and ball bearing sleeve respectively.

Pull the worm wheel shaft out of the frame, taking care that worm wheel or ball bearing E15 does not fall down and get damaged.

To exchange "fixed" ball bearing E12, screw three 3/8" screws into the threaded holes in the conveyor pulley and tighten them against protecting cover until the bearing is pressed loose. Heat the new bearing in oil to a temperature of 160-175° F (70-80° C) and drive it on to the shaft until it comes to rest against the conveyor pulley. NOTE: The protecting cover E13 with packing must first be slipped on to the shaft.

Before assembling, clean the parts of the worm wheel shaft with kerosene and wipe off the gear housing with a non-fluffy rag. See that ball bearings E12 and E15 have no defects and are well cleaned. Immerse them in oil before insertion.

FILL OIL INTO THE GEAR HOUSING.

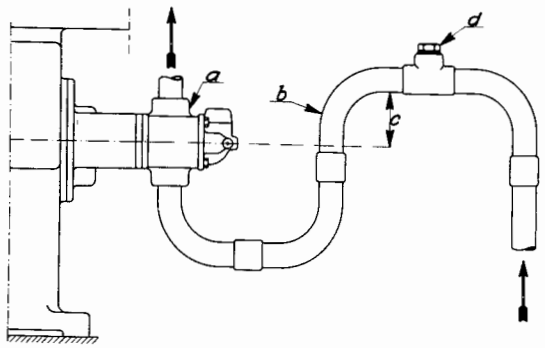
NOTE: These pumps are not included in the normal equipment of the separator but can be supplied on special demand.

DIRECT DRIVE FEED AND DISCHARGE PUMPS - see Fig. FEED AND DISCHARGE PUMPS in PARTS LIST

If desired, the separator can be fitted either with a single pump for pumping the liquid to or from the separator or with double pumps for pumping the liquid both to and from the separator. - In the following description the double pumps only are mentioned, but the instructions given also apply to the single pump.

The protecting cover is replaced with a pump adaptor F24. The pumps are driven by means of a pinion F9 fitted on the worm wheel shaft.

The pump being a gear pump, it is very important that metal objects, twist, wood splints and the like are prevented from entering the same. The suction pipe, therefore, should be equipped with a DE LAVAL strainer. If this is not used, the suction pipe should be fitted with a strainer device, placed as near the pump as possible. It is suggested to provide the strainer with a perforated metal sheet with 1 mm holes or a metal gauze with at least 12 mesh./inch.



a Pump
b Suction pipe
c min. 2" (50 mm)
d Filling screw

As a rule, the underpressure in the suction pipe should not exceed 4 lbs./sq.in. (0.3 kg/cm^2). If the storage tank lies lower than the pump so that the latter is emptied at standstill, the pipes should be fitted according to the above figure to ensure a good sucking capacity in the pump already from the start.

SHEARING PIN

To prevent overload of the gears if the counter-pressure becomes too high or the pump has been clogged by impurities, pinion F9 is provided with a shearing pin F8, which breaks in case of overload, so that pinion will idle on the worm wheel shaft. If the shearing pin has broken, shut off the feed immediately and replace the broken pin with one of the accompanying BRASS spare pins. NEVER USE PINS OF OTHER MATERIAL.

If the shearing pin keeps on breaking, it is usually due to solid impurities having entered the pump, which should then be taken apart and cleaned. Disconnect the pipe lines. Loosen fixing screws and remove shields F22. Take out gear wheels F27 (with short shaft) and clean them. The gear wheels F28 (with long shaft) need not be taken out, but should be wiped while being rotated by means of the worm wheel shaft. When assembling, make sure that packings F25 have no defects.

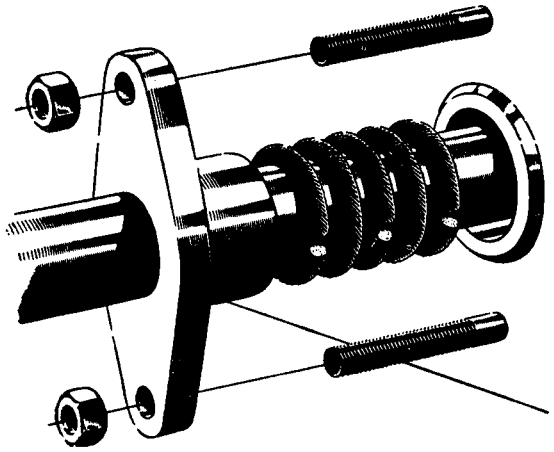
RELIEF VALVE

Each pump is provided with a relief valve F20, which is adjusted for a maximum discharge pressure of about 28 lbs./sq.in. (about 2 kg/cm^2). This makes it possible to regulate and even shut off the liquid flow by means of a throttle valve provided in the pressure pipe of the valve without the discharge pressure exceeding the said value.

However, if it is desired to work with a total delivery and suction height exceeding 65 to 85 feet (20-25 m) (corresponding to 28 - 35 lbs./sq.in. or 2 - 2.5 kg/cm^2), it will of course be necessary to increase the compression of the relief valve spring F21.

PACKING BOXES

If the packing in the packing boxes needs renewal, screw up nuts F2 as far as possible on screws and then screw the latter into the gland. Now push the gland up along the pump shaft. The packing should be inserted in the form of cut rings



with the cuts alternatingly disposed diametrically opposite one another. Now and then tighten the glands to prevent leakage.

WHEN ORDERING or when returning parts for repair always indicate:

Type designation of separator - see name plate

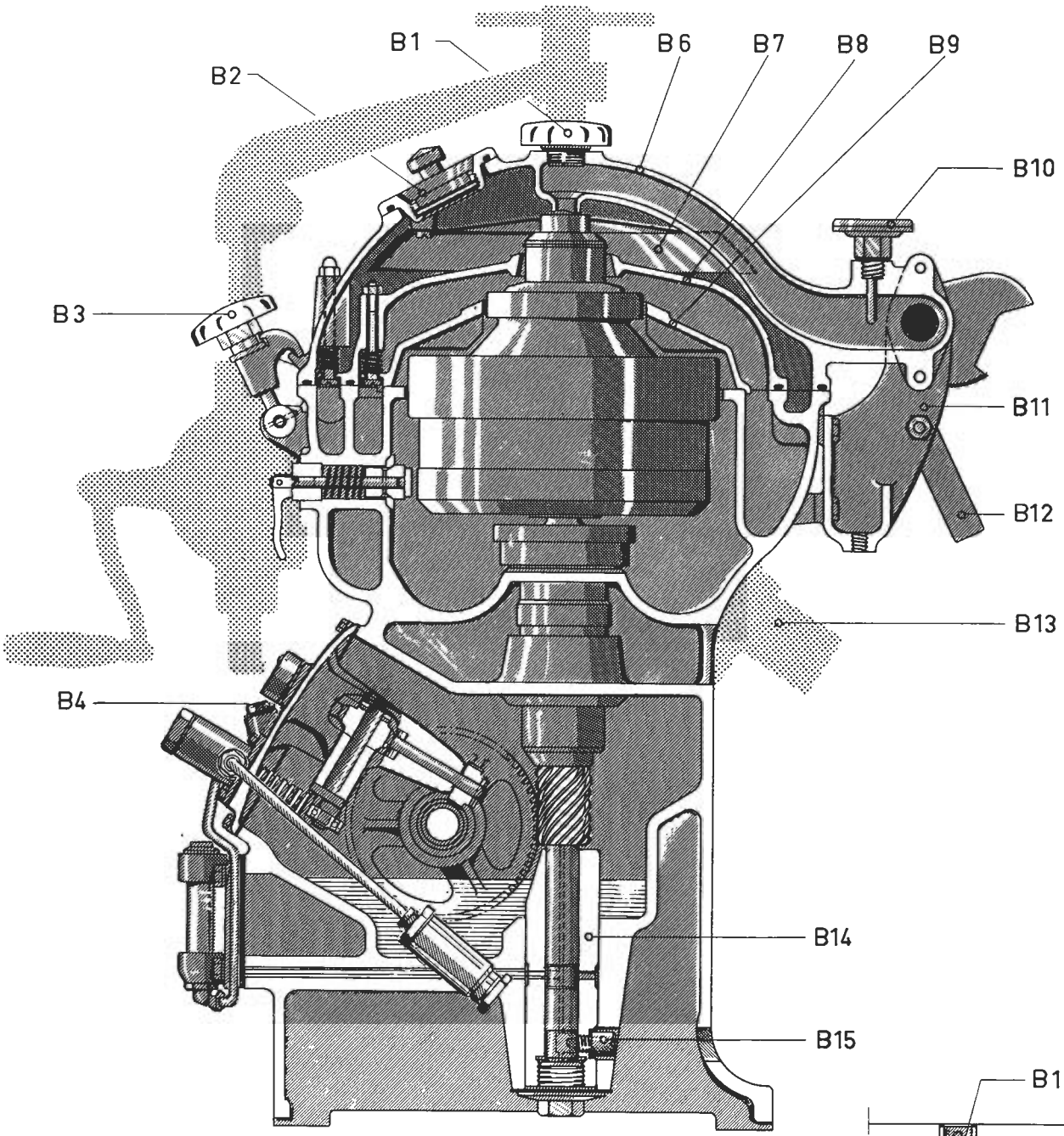
Serial number of separator - see name plate, top edge of frame or separator bowl

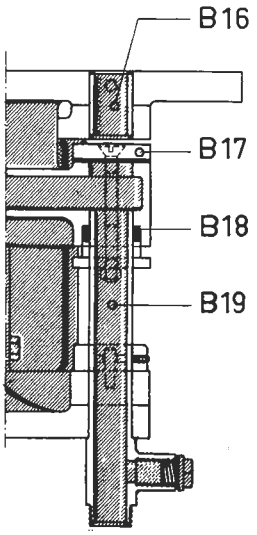
Number of individual separator parts - see the following list of parts.

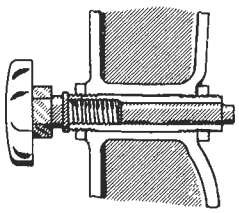
INDEX

Lettering	Part number B1500		Part number B1700		
B1	71131		71131		Filling plug - water
	38324		38324		Packing for B1
B2	37427		37427		Sight glass - complete
	37428		37428		Fixture for B2
	67813		67813		Rubber ring for B2
	71349		71349		Knurled nut for B2
	32642		32642		Packing for B2
	32641		32641		Glass for B2
	32640		32640		Lock ring for B2
	70485		70485		Screw for B2
B3	71110		71110		Hand wheel for clamp bolt
	71389		71389		Clamp bolt for frame hood
	71391		71391		Clamping shoe for B3
	72680		72680		Hinge pin for B3
	72474		72474		Slotted pin for B3
B4	34701		34701		Screw plug - lubricating oil
	34702		34702		Packing for B4
B6	68743		68680		Frame hood - outer part
B7	37431		37432		Splash guard
	7104		60366		Screw for B6
	32045		33423		Rubber ring for B6
B8	37253		37332		Frame hood - inner part (upper)
	32053		36962		Rubber ring for B8
	33355		33355		Spring for B8
	37237		37333		Screw for B8
	35193		35193		Washer for screw
	72886		72886		Cap nut for screw
	70560		70560		Washer for cap nut for screw
B9	33084		37331		Frame hood - inner part (lower)
	30560		30560		Spring for B9
	37236		37237		Screw for B9
	41274		41274		Nut for screw
	35193		35193		Washer for screw
B10	64002		64002		Thermometer
	9281		9281		Packing for B10
B11	68745		68689		Support for frame hood
	72596		70494		Screw for B11
B12	70183		70183		Bar for frame hood
	72875		72875		Screw for B12
	40036		40036		Nut for B12
	68693		68693		Spacing sleeve for B12
B13	36005		36005		Waste liquid tube
B14	37433	x1	37350	x1	Bottom bushing for bowl spindle
B14	63297	x2	63304	x2	Bottom bushing for bowl spindle
B15	8820		8820		Stop screw for bowl spindle
	8821		61973		Packing for B15
	33055		33055		Bottom screw
	8819		8819		Packing for bottom screw
B16	68690		68690		Hinge bolt for frame hood
	71145		71145		Stop screw for B16

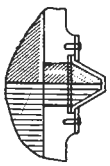
x1 frequency: 50 Hz
x2 frequency: 60 Hz



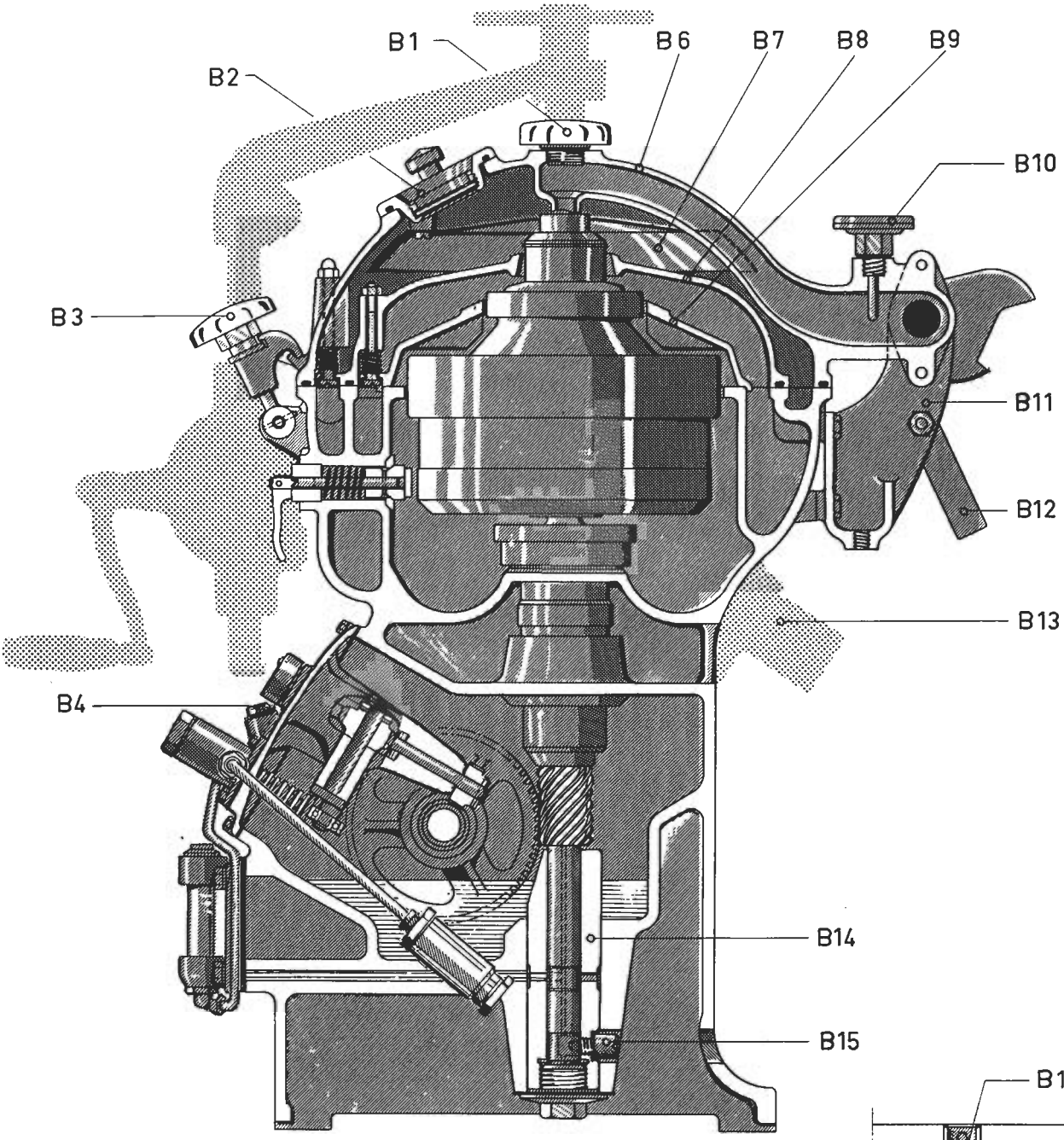


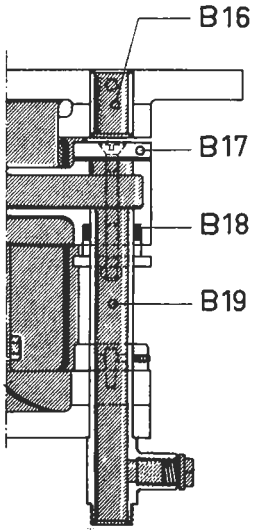


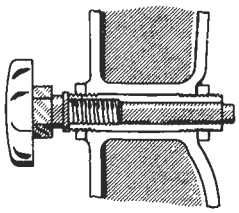
B 20



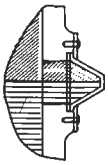
B21







B 20



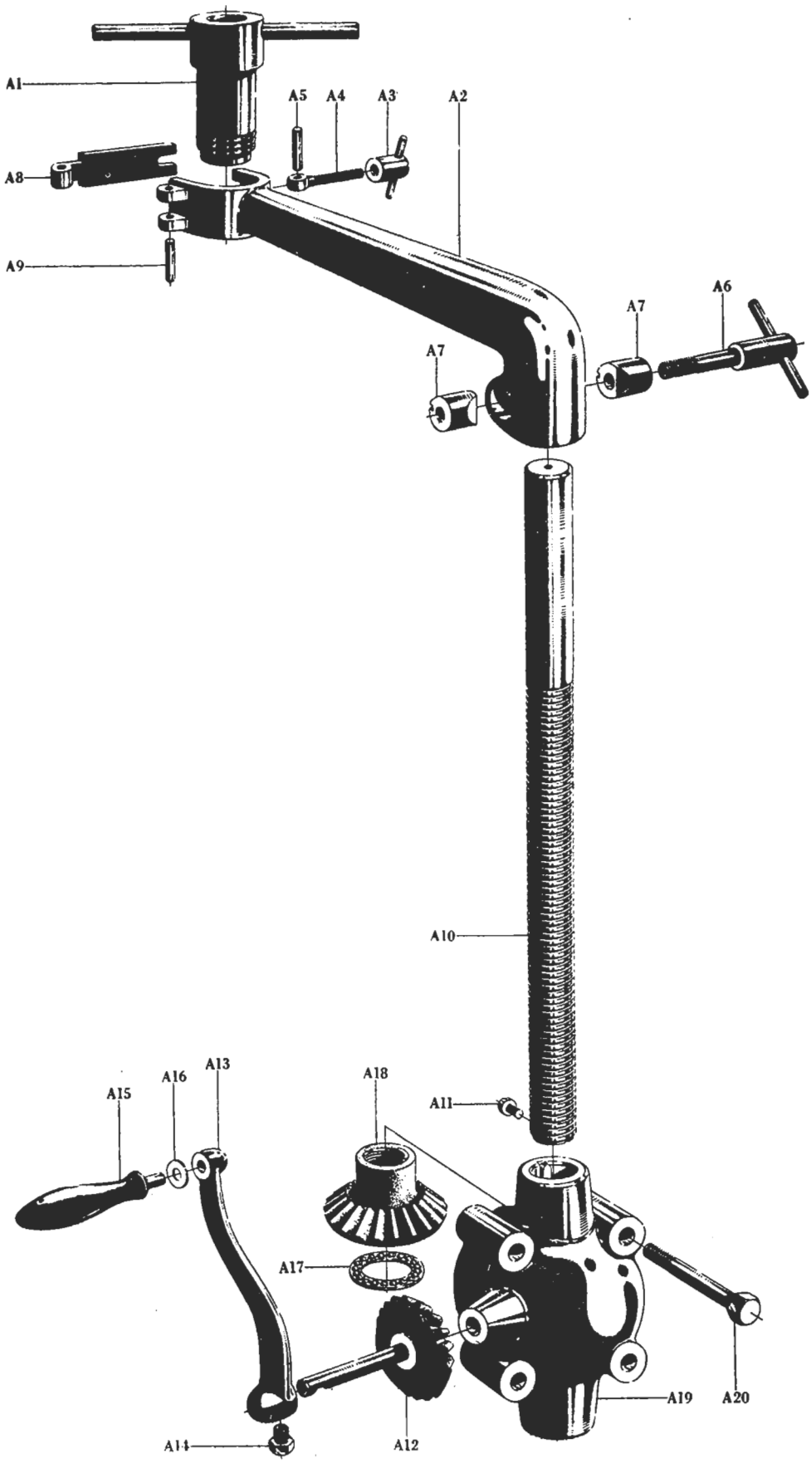
B 21

Lettering	Part number B1500	Part number B1700	
B17	37384	37384	End washer for inlet housing
	20417	20417	Screw for B17
	32627	32627	Packing for B17
B18	37194	37194	Gland for inlet tube
	40036	40036	Nut for B18
B19	68682	68682	Inlet tube
	67771	67771	Plug for B19
	68818	68818	Collar with stop screws, for B19
B20	71110	71110	Hand wheel for bowl lock
	72884	72884	Pin for B20
	64554	64554	Lock screw for B20
	33315	33315	Sleeve with nuts and lock washers, for B20
	72874	72874	Nut for sleeve, for B20
	68115	68115	Lock washer for sleeve, for B20
B21	8859	8859	Gauge glass for lubricating oil
	1104	1104	Packing for B21
	9175	9175	Fixing plate for B21
	2194	2194	Screw for B21
	39738	39738	Test cock for treated liquid

Lettering	Part number B1500	Part number B1700	Quantity	RESILIENT ANCHORAGE FOR FRAME - see fig. in chapter MOUNTING THE SEPARATOR
a1	o	o	4	Anchor bolt (not supplied with the machine)
a2	71125	71125	4	Cup
a3	65235	65235	4	Rubber cushion
a4	71126	71126	4	Cup cover
a5	o	o	8	Nut for anchor bolt (not supplied with the machine)

Lettering	Part number B1500	Part number B1700	
A	33067	37540	Bowl lifting device, complete
A1	33074	32658	Lifting screw
A2	33594	37541	Turnable arm
A3	-	65466	Lock nut
A4	-	72889	Hinged bolt
A5	-	65283	Hinge pin
A6	33069	33052	Clamp screw
A7	33070	33053	Clamping sleeves (pair)
A8	-	33042	Hinged plate
A9	-	65283	Hinge pin
A10	33076	33343	Spindle with stop screw
A11	65439	65439	Stop screw for A10
A12	33071	32663	Gear wheel with crank shaft
A13	65468	65468	Crank lever
A14	6110	6110	Stop screw
A15	65469	65469	Crank handle
A16	20758	20758	Spacing washer
A17	-	63443	Ball bearing
A18	33072	63444	Gear wheel
A19	33077	32656	Gear housing
A20	33079	-	Fixing screw x)
	-	32633	Fixing screw, short x)
-	-	66831	Fixing screw, long x)
-	-	32666	Spacing sleeve for long fixing screw x)
-	33050	-	Catch bolt with pin (for locking lifting screw A1)

x) These parts are not included in complete bowl lifting device.


A1
A5
A4
A3
A2
A8
A9
A6
A7
A7
A10
A13
A16
A15
A18
A11
A17
A19
A20
A14
A12

Lettering	Part number B1500	B1700	
			Standard bowl
C1	30186	30061	Lock ring, small
C2	65593	69270	Rubber ring, small
C3	x)	x)	Lock ring, large
C4	x)	x)	Bowl hood
C5	39549	64105	Rubber ring, large
C6 517851-81	~~73329~~	73345	Bowl disc
C7	x)	x)	Distributor
C8	39180	39181	Strainer ring
C9	x)	x)	Bowl body
C10	-	32914	Gravity disc, internal diameter 119 mm
	-	32913	" " " " 109 "
	-	32912	" " " " 101 "
	-	32911	" " " " 95 "
	33108	-	" " " " 91 "
	-	32910	" " " " 90 "
	-	32909	" " " " 86 "
	33109	32908	" " " " 83 "
	33110	-	" " " " 78 "
	33111	-	" " " " 75 "
	33112	-	" " " " 73 "
C11	x)	x)	Top disc with neck
C12	33115	32955	Discharge collar
C13	x)	x)	Top disc without neck
C14 517851-82	~~73331~~	73347	Bottom disc
			Cap nut, Packing for cap nut } See BOWL SPINDLE

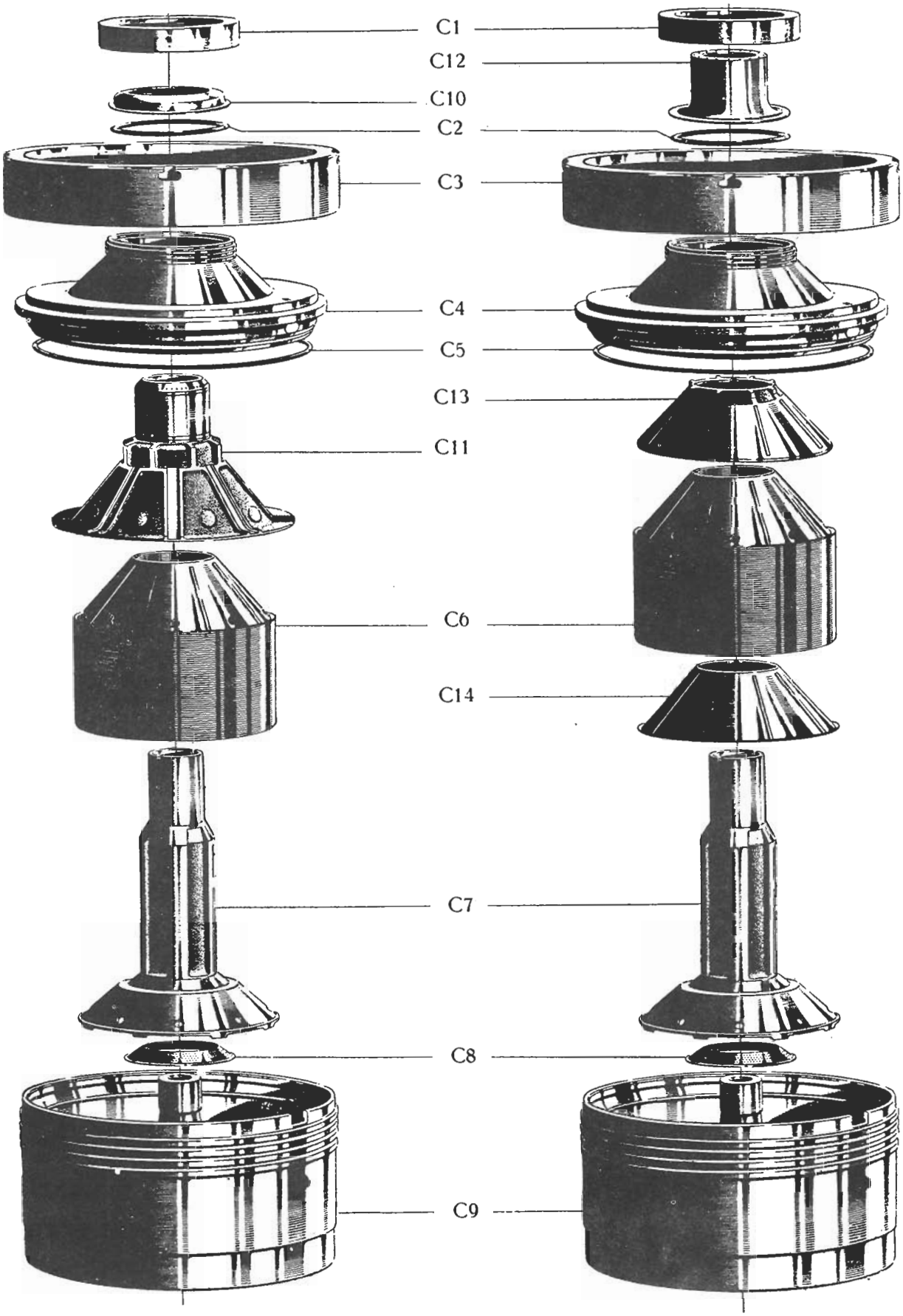
Left illustration shows:

Purifier bowl

Right illustration shows:

Clarifier bowl

x) Exchange of this part necessitates rebalancing of the bowl and can thus be carried out only in an authorized DE LAVAL workshop. If the bowl is delivered with equipment both for purification and clarification, both the accompanying top discs have been balanced. However, if a new top disc must be procured, rebalancing of the bowl becomes necessary.


C1
C12
C10
C2
C3
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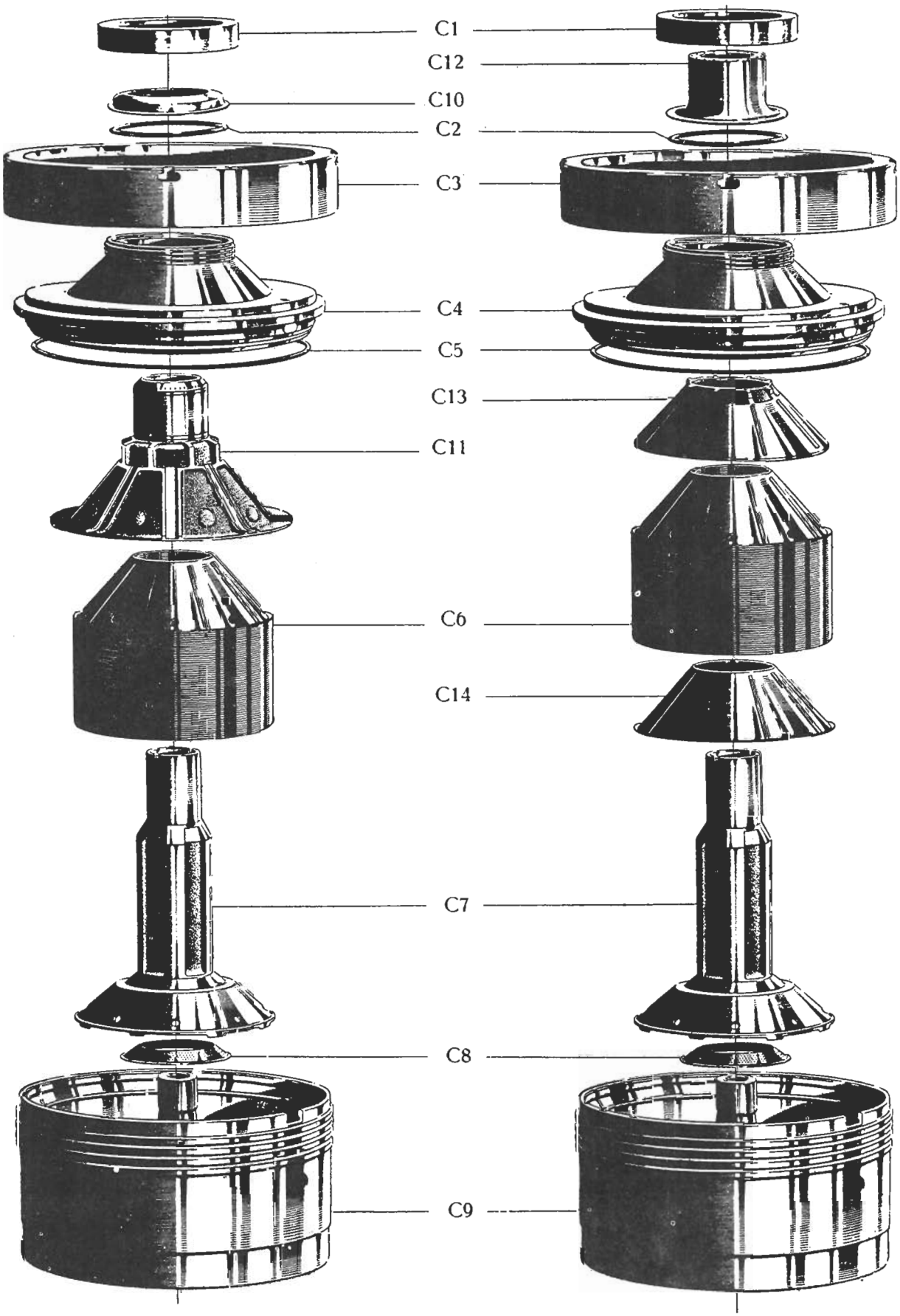
C11
C6
C14
C7
C8
C9


C1
C12
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C2
C3
C4
C5
C13
C11
C6
C14
C7
C8
C9

Lettering	Part number B1500	Part number B1700	
			Bowl of stainless steel
C1	30186	30061	Lock ring, small
C2	65593	69270	Rubber ring, small
C3	x)	x)	Lock ring, large
C4	x)	x)	Bowl hood
C5	39549	64105	Rubber ring, large
C6	~~73329~~ 517851-8	73345	Bowl disc
C7	x)	x)	Distributor
C8	39180	39181	Strainer ring
C9	x)	x)	Bowl body
C10	-	74099	Gravity disc, internal diameter 119 mm
	-	74098	" " " " 109 "
	-	74097	" " " " 101 "
	-	74096	" " " " 95 "
	73735	-	" " " " 91 "
	-	74095	" " " " 90 "
	-	74094	" " " " 86 "
	73734	74093	" " " " 83 "
	-	74092	" " " " 82 "
	73733	-	" " " " 78 "
	73732	-	" " " " 75 "
	73731	-	" " " " 73 "
	73730	-	" " " " 71,5 "
	73729	-	" " " " 70 "
C11	x)	x)	Top disc with neck
C12	73728	74091	Discharge collar
C13	x)	-	Top disc without neck
C14	~~73331~~ 517851-8	73347	Bottom disc
			Cap nut, Packing for cap nut } See BOWL SPINDLE

Left illustration shows:
Purifier bowl

Right illustration shows:
Clarifier bowl

x) Exchange of this part necessitates rebalancing of the bowl and can thus be carried out only in an authorized DE LAVAL workshop. If the bowl is delivered with equipment both for purification and clarification, both the accompanying top discs have been balanced. However, if a new top disc must be procured, rebalancing of the bowl becomes necessary.

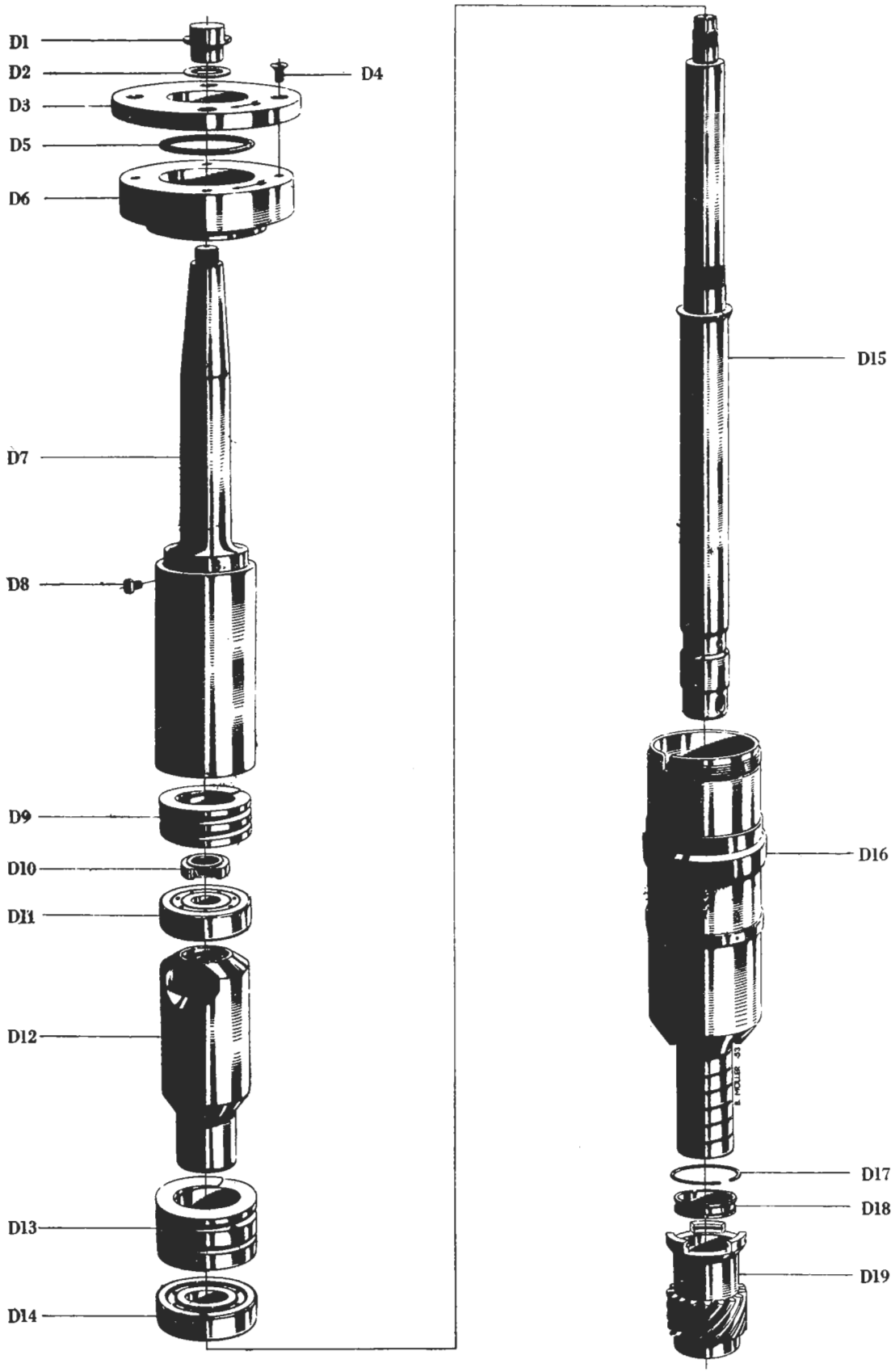
Lettering	Part number B1500	Part number B1700	
	75401 x1	75407 x1	Bowl spindle, complete
	75403 x2	75408 x2	Bowl spindle, complete
D1	33331	32722	Cap nut
D2	5684	32985	Packing
D3	37728	37737	Gland
D4	37729	37729	Fixing screw for D3
D5	66554	65201	Rubber ring
D6	x3	x3	Lock nut
D7	x3	x3	Spindle sleeve with guide screw
D8	8811	8811	Guide screw for D7
D9	8808	8831	Spring, upper
D10	8807	8830	Lock nut
D11	8806	6548	Ball bearing, upper x4
D12	9060	8828	Inner sleeve
D13	8804	8827	Spring, lower
D14	6616	8826	Ball bearing lower x4
D15	74896	74897	Centre rod
D16	x3	x3	Outer sleeve
D17	8814	8836	Elastic steel ring
D18	8815	8837	Interlining ring
D19	37230 x1	37325 x1	Worm
D19	63302 x2	63307 x2	Worm

x1 Frequency: 50 Hz

x2 Frequency: 60 Hz

x3 Exchange of this part necessitates a rebalancing of the bowl spindle and can be carried out only by an authorized DE LAVAL workshop. Send in the complete spindle.

x4 As this ball bearing is of special design it is absolutely necessary, when ordering, to contact a DE LAVAL representative.


D1
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D9
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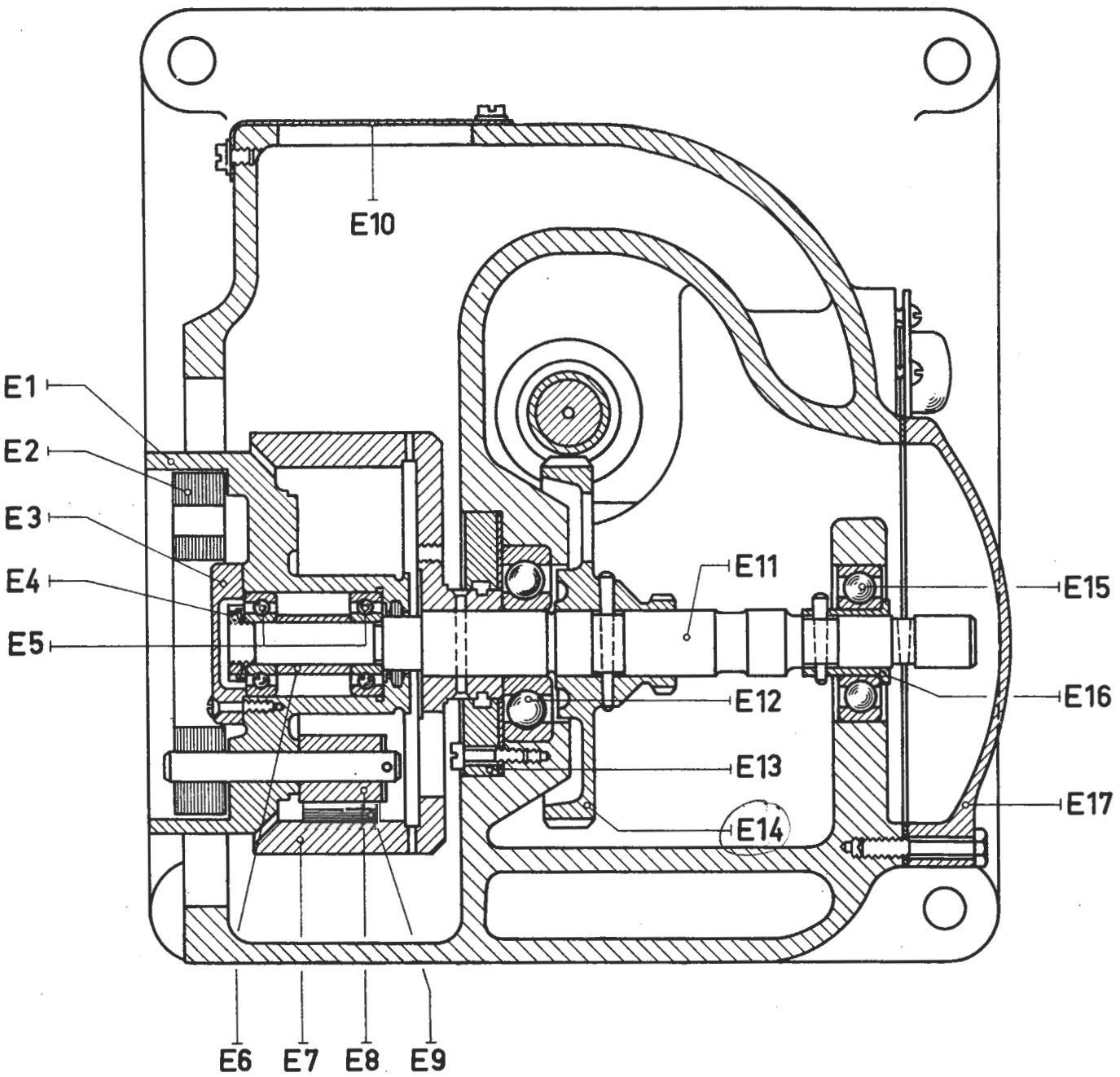
D11
D12
D13
D14
D15
D16
D17
D18
D19

Lettering	Part number B1500		Part number B1700		
E1	39505	x1	39195	x1	Coupling pulley with friction clutches
E1	63298	x2	39505	x2	Coupling pulley with friction clutches
E1	39196		39196		Coupling pulley with sealing ring
	7028		7028		Sealing ring for E1
E2	36121		36121		Elastical plate
E3	34904		34904		Protecting cover for E5
	12600		12600		Screw for E3
E4	34911		34911		Round nut with lock washer, for E5
	34912		34912		Lock washer for E4
E5	20565		20565		Ball bearing for E1
E6	36209		36209		Spacing sleeve for E5
E7	o		o		Conveyor pulley
E8	36129	x1	36233	x1	Friction clutches - a pair
E9	8107	x1	9597	x1	Friction pad with screws
E8	63299	x2	36129	x2	Friction clutches - a pair
E9	8107	x2	8107	x2	Friction pad with screws
	8341		8341		Screw for E9
	8115		8115		Washer for E8
	8114		8114		Split pin for E8
E10	37250		66669		Side cover for frame
	70560		70560		Washer for E10
	12172		12172		Screw for E10
E11	36263		37545		Worm wheel shaft including E4, E7, E12 and E13
E11	36264		37351		Worm wheel shaft
E12	36094		36094		Ball bearing - "fixed"
E13	9807		9807		Cover for E12
	9808		9808		Packing for E13
	7391		7391		Screw for E13
E14	37242	x1	37339	x1	Worm wheel with pin
E14	63303	x2	63308	x2	Worm wheel with pin
	6362		6362		Pin for E14
E15	38129		38129		Ball bearing - loose, with sleeve and pin
E16	36023		36023		Sleeve for E15
	8985		8985		Pin for E15
E17	37213	x3	37213	x3	Protecting cover
	36122		36122		Packing for E17
	20758	x3	20758	x3	Washer for E17
	12468	x3	12468	x3	Screw for E17

x1 Frequency: 50 Hz
x2 Frequency: 60 Hz
x3 Not used with pump drive


E10
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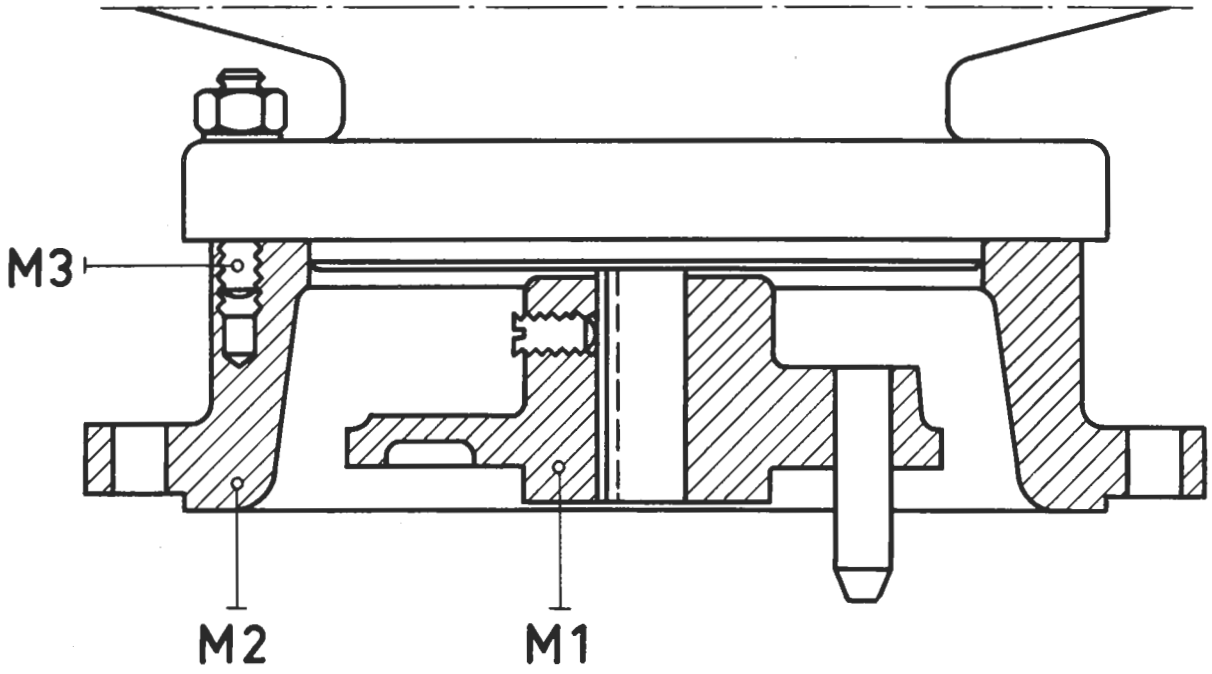
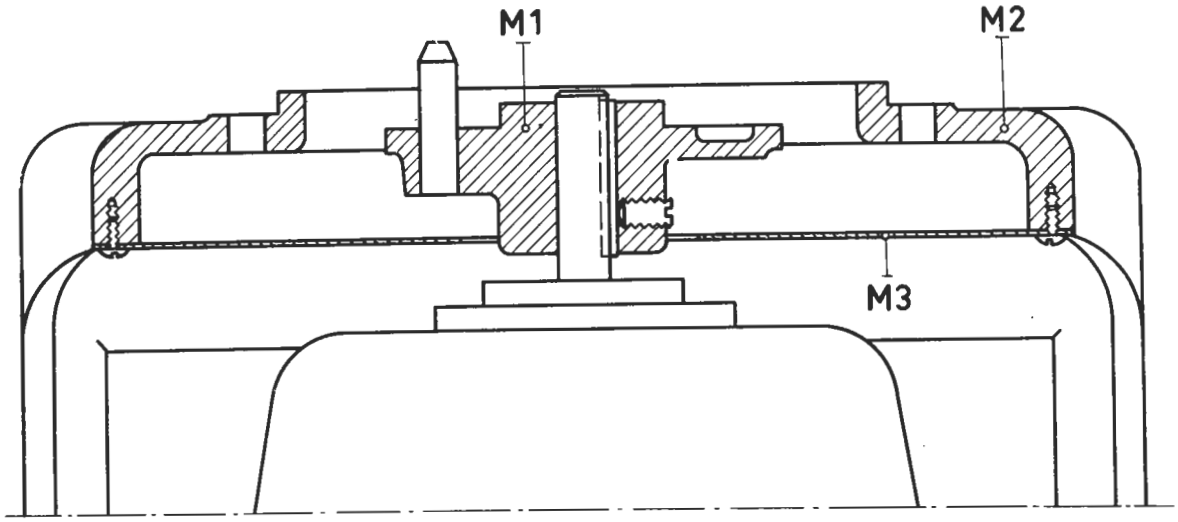
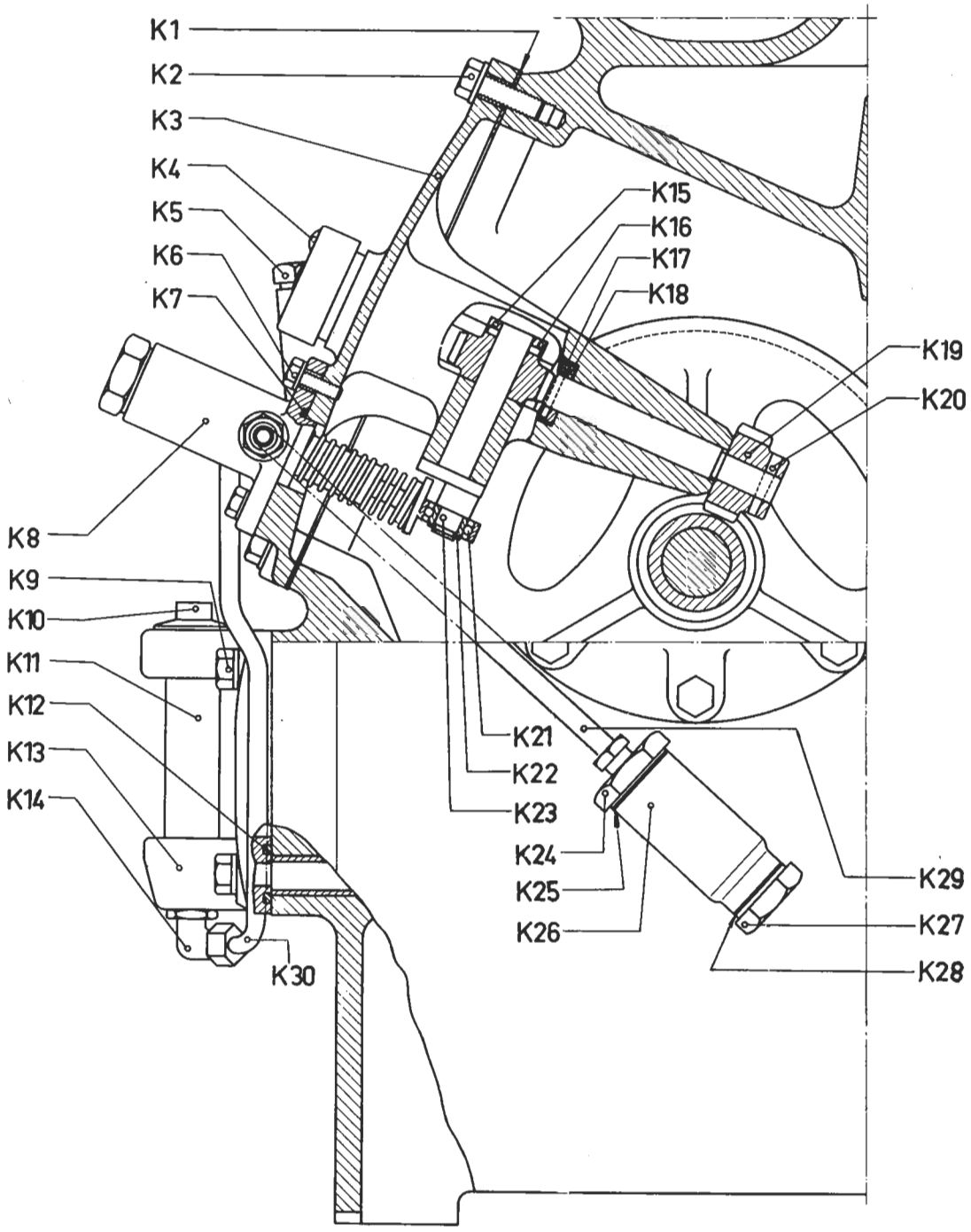
E9



Lettering	Part number B1504	B1704	
M1	36089	36089	Coupling pulley with stop screw, for motor shaft
	12396	12396	Stop screw for M1
M2	39727	37628	Motor adaptor
	65231	65231	Screw for M2
	70492	70492	Washer for M2
M3	o	o	Screw for motor
	41330	41330	Nut for M3



Lettering	Part number B1509	Part number B1709	
M1	36089	36089	Coupling pulley with stop screw, for motor shaft
	12396	12396	Stop screw for M1
M2	o	o	Motor bracket
M3	o	o	Protecting shield
	2194	2194	Screw for M3
	11622	11622	Washer for M3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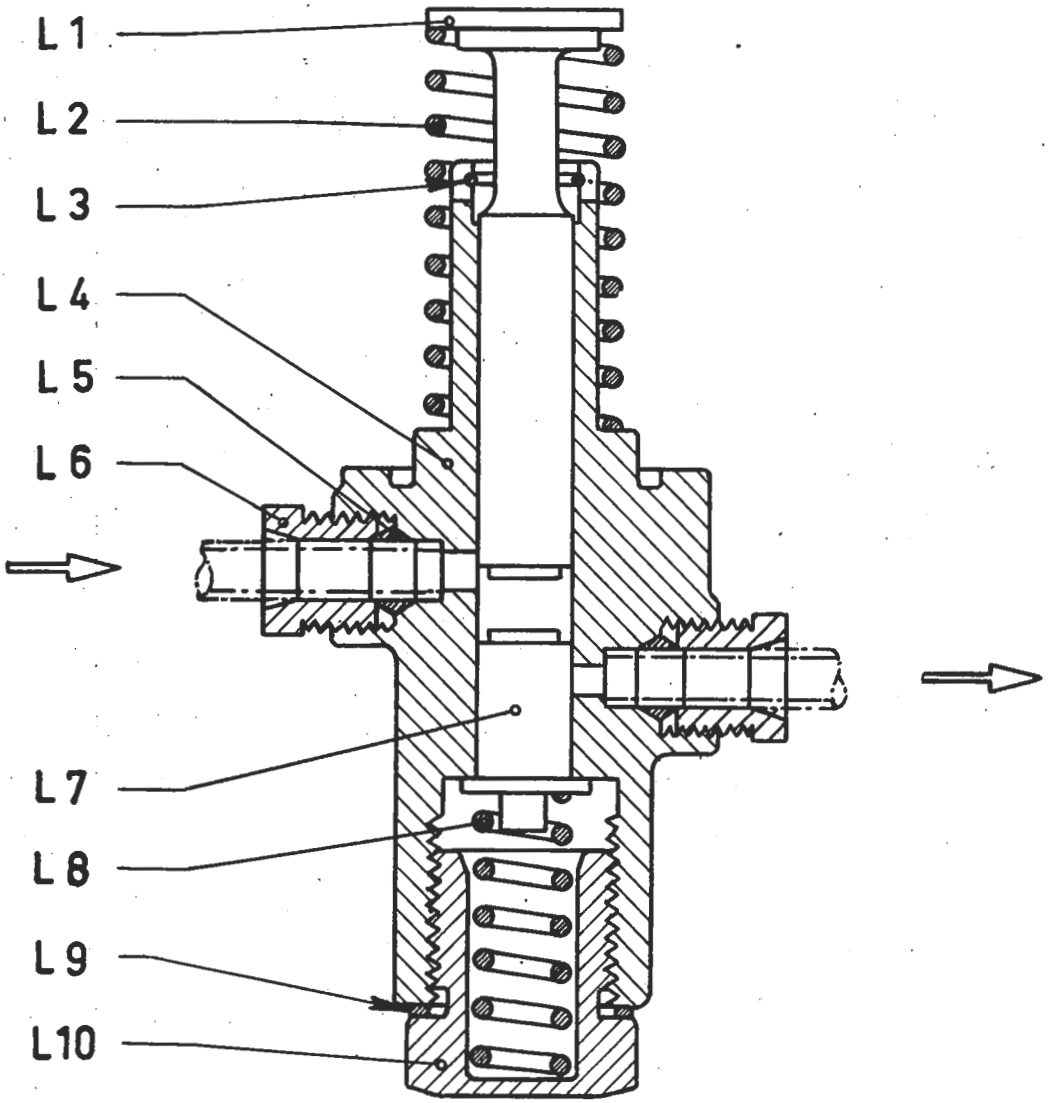
Lettering	Part number B1500	Part number B 700 B1700	Quantity	
	73792	73786	1	Worm wheel guard, complete, with revolution counter and lubricating pump
K1	37245	37342	1	Packing
K2		34963	6	Screw
K2	34963		4	Screw
K2	40036		2	Nut
-	70485		2	Stud bolt for K2
-	20758	20758	6	Washer for K2
K3	73793	73787	1	Worm wheel guard
K4	73788	73788	1	Revolution counter shaft with cap
K5	73783	73783	1	Filling plug for lubricating oil
-	37402	37402	1	Packing for K5
K6	72863	72863	2	Screw for lubricating pump
-	11622	11622	2	Washer for screw
K7	67032	67032	1	Rubber ring
K8	73766	73766	1	Lubricating pump
K9	34963	34963	4	Screw
-	20758	20758	4	Washer for K9
K10	73778	73778	1	Plug
K10-14	73772	73772	1	Lubricating oil indicator
K11	73777	73777	1	Glass tube
-	71042	71042	1	Packing collar for K11
K12	67035	67035	1	Rubber ring
K13	73773	73773	1	Cover
K14	73774	73774	1	Angle coupling with indicating tube
K15	69212	69212	1	Slotted pin
K16	73765	73765	1	Gear wheel
K17	69212	69212	1	Slotted pin
K18	73761	73761	1	Worm for lubricating pump
K19	67979	67979	1	Gear wheel with pin
K20	583	583	1	Pin
K21	73764	73764	1	Ball bearing
K22	13760	13760	1	Snap ring
K23	73763	73763	1	Eccentric
K24	73780	73780	1	Plug with oil strainer and pipe coupling
K25	33749	33749	1	Packing
K26	73779	73779	1	Strainer housing
K27	73783	73783	1	Screw plug
K28	37402	37402	1	Packing
K29	73794	73790	1	Suction pipe
K30	73795	73791	1	Delivery pipe



Lettering	Part number	Quantity	
L1	o	1	Pump piston
L2	73769	1	Spring for L1
L3	74899	1	Elastic steel ring
L4	o	1	Pump body
L5	73770	2	Double cone
L6	73771	2	Clamp sleeve
L7	o	1	Valve piston
L8	73767	1	Spring for L7
L9	73768	1	Packing
L10	73799	1	Plug

WESTFALIA SEPARATOR

Data Sheet

ETA 20, ETB 50 Separators

with solid-wall bowl

ETB 50-03-024

ETA 20-03-024

ETB 50-03-024

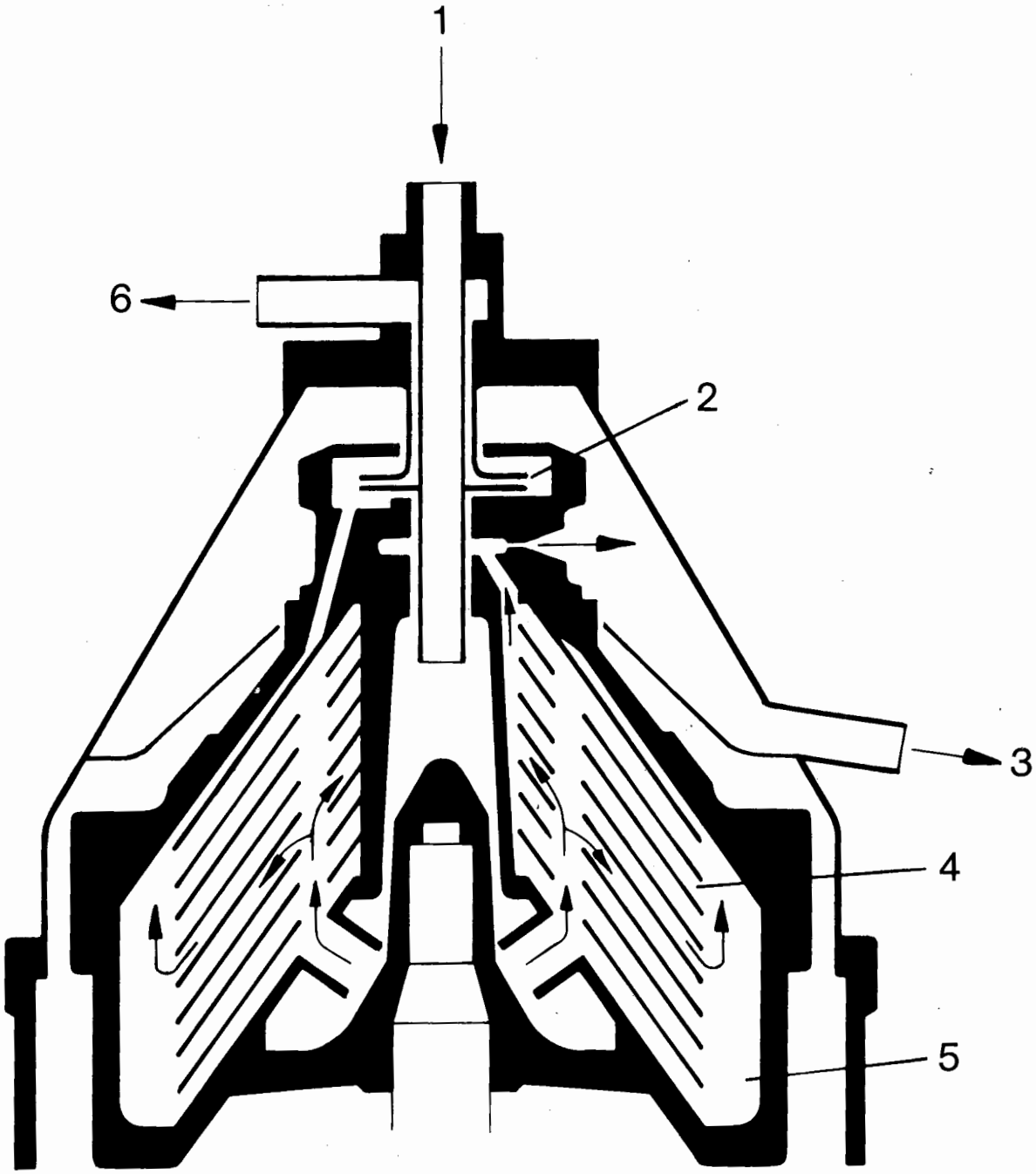
Function

Clarification and de-oiling of cooling, cutting and rolling emulsions, as well as industrial waters, washing liquids and cooling water.
Separation of exhausted and previously broken emulsions.
De-oiling of condensates.

Fields of application

Rolling mills, engineering works, automobile industries.

Operating principles and constructional features



1 Feed
2 Centripetal pump, heavy phase
3 Light phase discharge
4 Disc stack
5 Sediment holding space
6 Heavy phase discharge

These centrifuges are used for continuous separation of two mutually immiscible liquids of different densities, with simultaneous removal of solids.

Bowl

The ETA/ETB separators are equipped with a solid-wall disc-type bowl.
The product enters the rotating bowl via feed (1) and is separated into a light and heavy phase in disc stack (4). The solids are removed simultaneously. The heavy phase is conveyed foamfree and under pressure by centripetal pump (2) to outlet (6). The light phase emerges freely at the bowl top and discharges from the hood through pipe (3). The separated solids collect in the sediment holding space (5) and must be removed by hand when the machine is stopped.

Feed and discharge

The product is fed through a closed piping system. The heavy phase is discharged under pressure by centripetal pump (2) through outlet (6). The light liquid phase discharges by gravity through hood outlet (3).
A pressure gauge and regulating valve in the discharge line for the heavy phase allow best possible adjustment of the separating efficiency.

Frame and drive

The cast-iron frame is coated with special paint. It is equipped with a tachometer for speed indication, an oil level sight glass, brakes and bowl lock screws.
The centrifuge is driven by a built-in motor, type B9, protection class IP 55. Power is transmitted to the bowl spindle via a centrifugal clutch and a worm wheel gear.
All bearings and the gear are splash lubricated from a central oil bath.

Materials of construction

All product contact parts are made of stainless steel.

Assembly and disassembly

The hood and fittings are removable without special tools. Tools for assembly and disassembly of the bowl are supplied with the machine.

Optional extra

Flowmeter for product feed.

Advantages of continuous treatment of emulsions

Removal of tramp oil and clarification of emulsions result in

- longer service life of tools
- longer emulsion life
- economical machining
- less waste water and reduced loading of the sewage system
- lower costs for operating fluids and disposal.

Technical data

Dimensions in mm

Type	a	b	c
ETA 20	840	530	945
ETB 50	920	680	1180

Technical data

	ETA 20	ETB 50
Bowl		
Speed	7200 min^{-1}	6000 min^{-1}
Bowl volume	5 ltr	14 ltr
Sediment holding space	2 ltr	6 ltr
Maximum discharge pressure of centripetal pump	4 bar	4 bar
Three-phase AC motor		
Power	3.5 kW	5.5 kW
Speed at 50 Hz	1500 min^{-1}	1000 min^{-1}
Speed at 60 Hz	1800 min^{-1}	1200 min^{-1}
Type	B 9	B 9

Weights and shipping data

Weight of separator with motor, bowl and accessories	net 365 kg	–
	gross 465 kg	–
Weight of separator with motor and accessories, without bowl	net –	520 kg
	gross –	620 kg
Weight of bowl	net –	175 kg
	gross –	205 kg
Packing case dimensions (L x W x H)		
Frame with motor and bowl	1220 x 660 x 1050 mm	–
Frame with motor	–	1300 x 860 x 1060 mm
Bowl	–	500 x 500 x 560 mm
Shipping volume	0.85 m^3	1.3 m^3

Capacity

Clarification of emulsion	up to 2000 l/h	up to 5000 l/h
Emulsion breaking and de-oiling of waste water	1200–1500 l/h	3000–3500 l/h
De-oiling of washing liquids	up to 2000 l/h	up to 5000 l/h

Subject to modification

WESTFALIA SEPARATOR

Westfalia Separator AG

Postfach 3720 · D-4740 Oelde

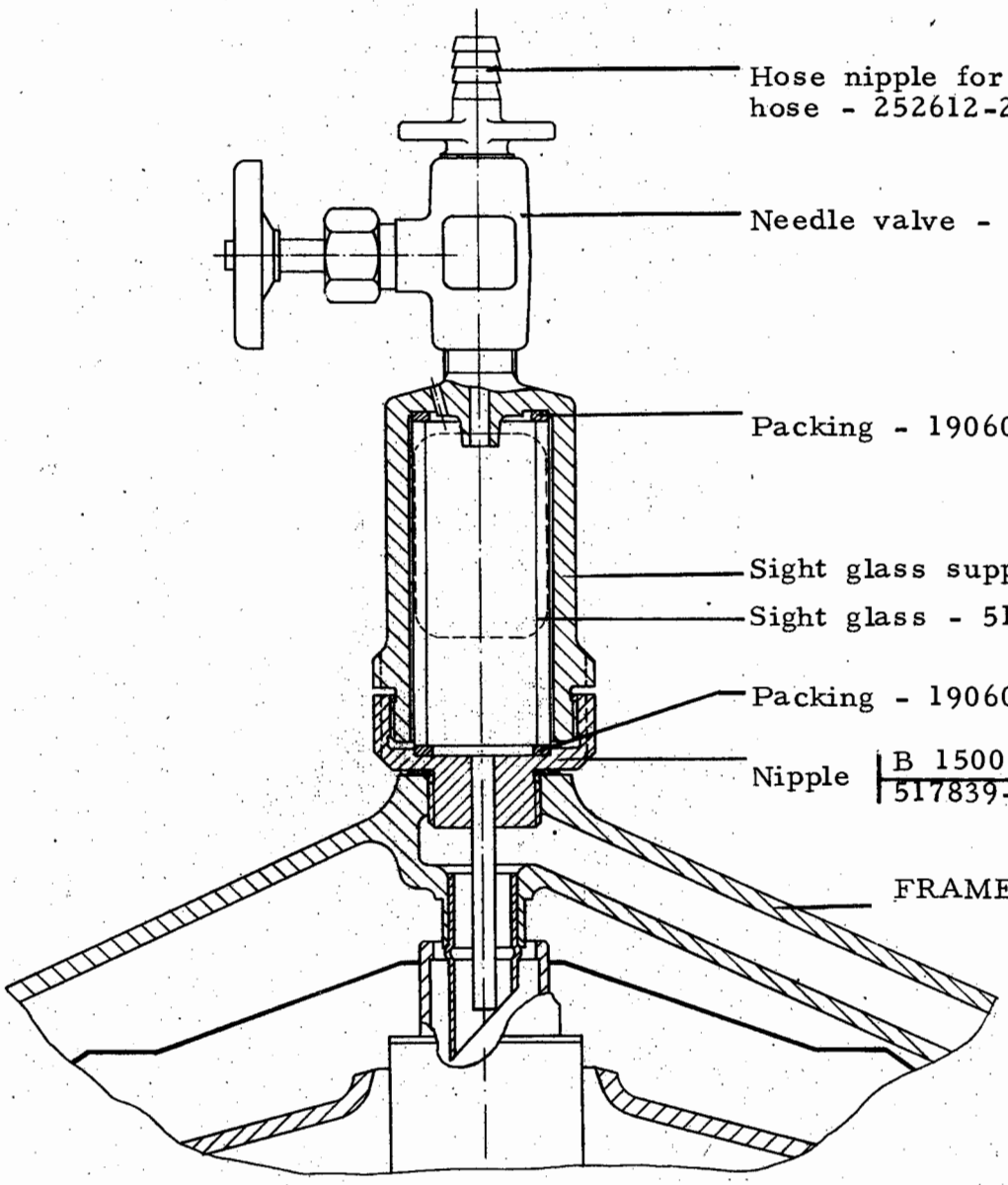
Phone: (02522) 77-1 · Telefax: (02522) 77-488

Telex: 89474 · Telegram Address: Westfalia Oelde

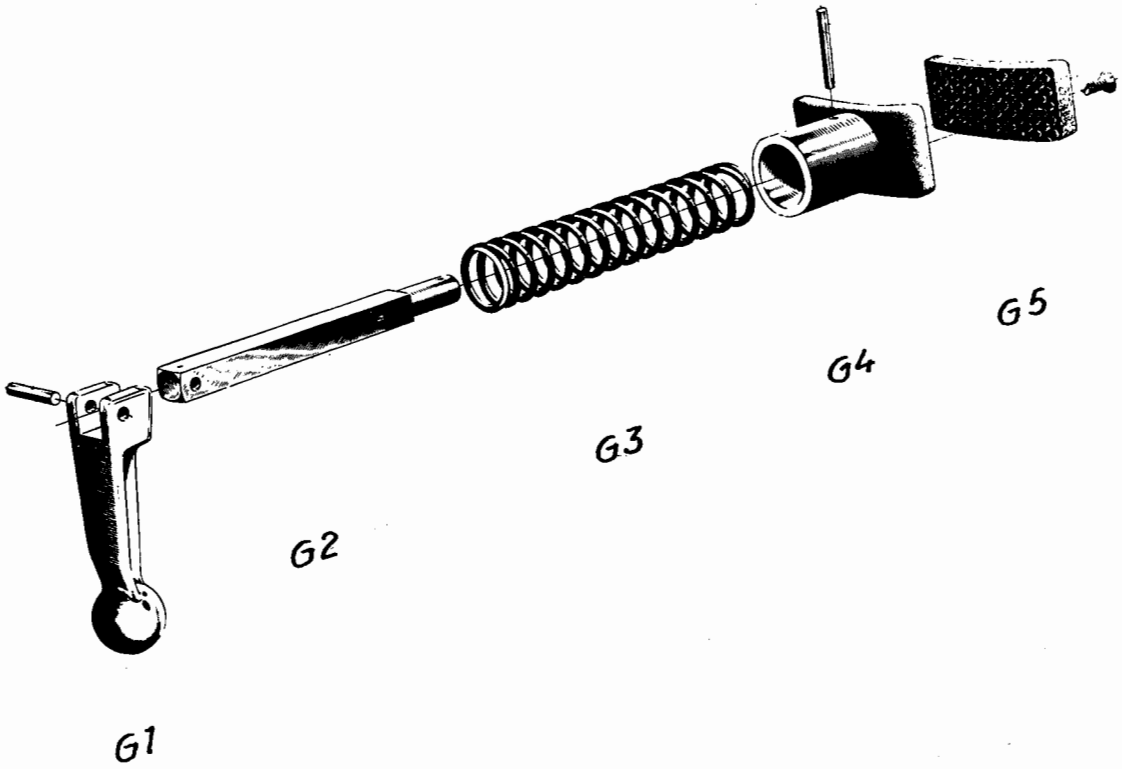
9997-6996-000/0286

Printed in W. Germany

Water admixing device, complete	B 1500	B 1700	VIB 1900
	517842-83	517842-84	517842-85



Nipple	B 1500	B 1700	VIB 1900
	517839-83	517839-84	517839-85



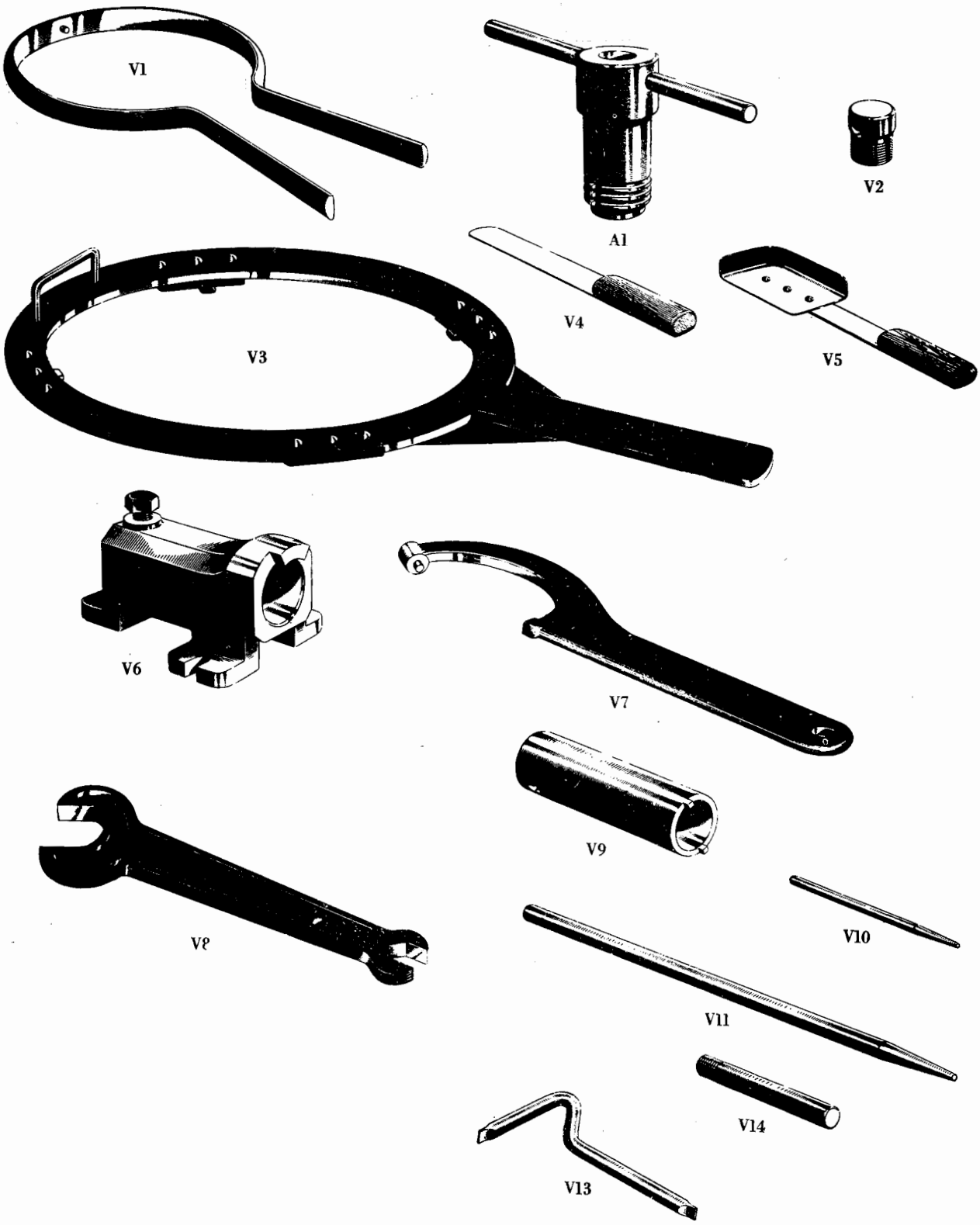
Lettering	Part number	Quantity	
	68674		Brake device, complete
G1	9909	1	Handle
	68675	1	Pin for G1
G2	37322	1	Brake spindle
	1227	1	Pin for G2
G3	37323	1	Spring
G4	36010	1	Brake shoe with spindle, plate and lining
G5	33329	1	Lining with rivets

Part number B1500	Part number B1700	Quantity	
			SPARE PARTS SUPPLIED WITH EACH SEPARATOR
32053	36962	1	Rubber ring for upper inner part of frame hood
32045	33423	1	Rubber ring for outer part of frame hood
8820	8820	1	Stop screw for bowl spindle
65593	69270	2	Small rubber rings for separator bowl
39549	64105	4	Large rubber rings for separator bowl
~~73329~~	73345	1	Bowl disc
66554	65201	2	Rubber rings for bowl spindle
8806	6548	1	Upper ball bearing for bowl spindle
6616	8826	1	Lower ball bearing for bowl spindle
8107	9597x1	2	Friction pads for friction clutch (with fixing screws)
-	8107x2	2	
37648	37648	3	Shearing pins for pinion (only for separator provided with direct drive pump)
71221	71222		Sludge catching paper for separator bowl (not included in standard equipment)
190609	190609	1	Packing for water admixing device

5/1985/-81

x1 Frequency: 50 C/S
x2 Frequency: 60 C/S

Lettering	Part number B1500 X B1700		
A1	33074	32658	Lifting screw
V1	30199	30098	Spanner for small lock ring
V2	33149	32723	Screw plug for loosening bowl body from spindle
V3	33148	32816	Spanner for large lock ring
V4	32818	32818	Sludge knife
V5	33152	33152	Sludge scoop
V6	8946	8947	Holder for spindle (with lock screw)
-	8949	8949	Lock screw for holder
V7	8833	8829	Hook spanner for lock nut of spindle
V8	36290	36290	Spanner, 5/8" & 1 15/32" (16 & 37 mm) for bottom screw and cap nut of relief valve
V9	37996	37996	Pin spanner for round nut for ball bearings of coupling pulley (not supplied for V belt drive)
V10	2279	2279	Drift, small
V11	7468	7468	Drift, large
V13	14486	14486	Screw driver
V14	-	40336	Guide bolt for motor (not supplied for V belt drive)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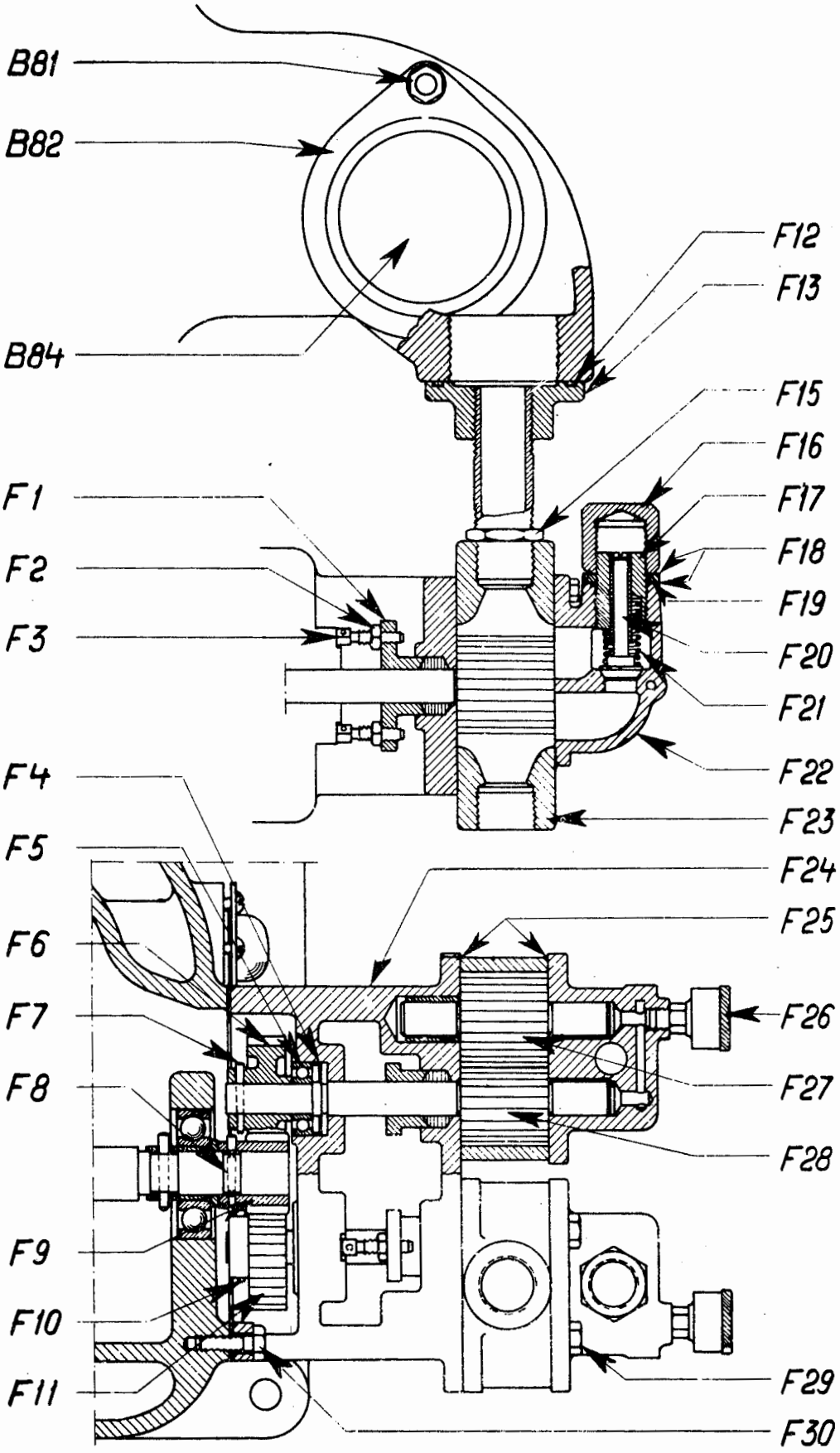
Lettering	Part number B1500	Part number B1700	
			SIGHT GLASS FOR LIQUID OUTLETS
B81	71142	71142	Cap nut
	71349	71349	Knurled nut
-	37547	37547	Stud bolt
B82	70185	70185	Fixture
-	68076	68076	Seal ring
B84	70196	70196	Glass
			PUMP DEVICE
-	38172	38268	Discharge pump
-	38171	38267	Feed pump
-	37329	37345	Feed and discharge pump
F1	35047	35047	Gland
F2	35119	35119	Lock nut for set screw for F1
F3	35048	35048	Set screw for F1
F4	36130	36130	Oil retaining washer for F5
F5	12174	12174	Ball bearing
F6	36271	36271	Driving wheel for pump shaft (feed)
F7	36530	36530	Pin for F6
F8	37648	37648	Shearing pin for F9
F9	36273	36273	Pinion for pump
F10	36530	36530	Pin for F11
F11	36210	36210	Driving wheel for pump shaft (discharge)
F12	32052	32046	Rubber ring for F13
F13	37224	37344	Connection flange with nut
F15	32956	36666	Nut for F13
F16	35050	35050	Cap nut for relief valve
F17	35052	35052	Adjusting screw for relief valve
F18	9733	9733	Packings for F16 and F19
F19	35077	35077	Lock nut for regulating screw
F20	35051	35051	Valve spindle and cone
F21	35049	35049	Valve spring
F22	35044	35044	Shield
F23	36269	36123	Pump housing
F24	37221	37221	Pump adaptor
F25	35053	35053	Packings for F23 and F24
F26	36430	36430	Grease cup
F27	35054	35069	Gear wheel with short shaft
F28	36270	36127	Gear wheel with long shaft
F29	72875	72888	Fixing screw for shield
F30	34963	34963	Fixing screw for F24
			WHEN USING FEED OR DISCHARGE PUMP
-	36124	36124	Protecting plate
-	65439	65439	Fixing screw for protecting plate
-	61005	61005	Screw plug (for shaft hole)
-	35077	35077	Nut for screw plug
-	9733	9733	Packing for screw plug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