

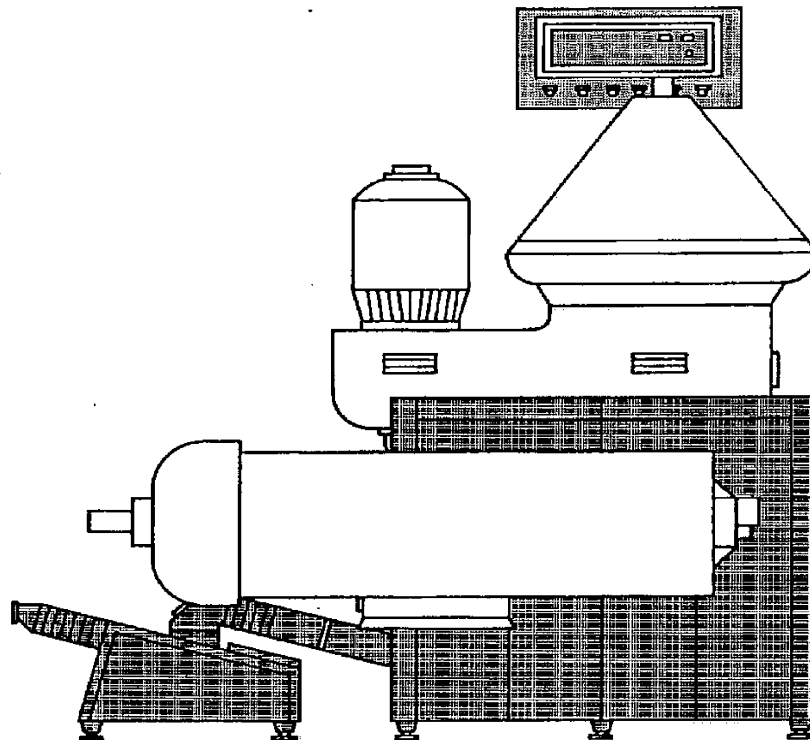


Mechanical Separation
Division

Westfalia Separator AG

Instruction Manual and Parts List

No.: 1170-9001-004
Edition: 0979
Designation: Milk Separator
with Self-Cleaning Bowl
(with incorporated piston valve)
Model: MSA 130-01-076



Subject to modification!

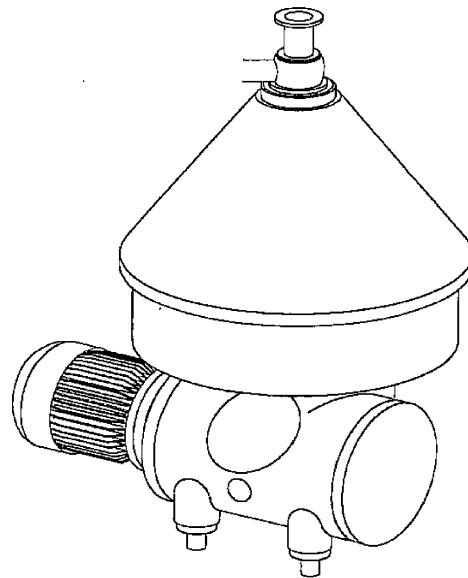


Fig. 1

GEA Westfalia Separator D-59302 Oelde (F. R. Germany)		<input type="text"/>
Model	<input type="text"/>	S/N <input type="text"/>
Built in	<input type="text"/>	Ø in mm <input type="text"/>
Max. admissible rated bowl speed in min ⁻¹		<input type="text"/>
Max. admissible density in kg/dm ³ of product		<input type="text"/>
Heavy liquid kg/dm ³	<input type="text"/>	Solids kg/dm ³ <input type="text"/>
min/max throughput m ³ /h		<input type="text"/>
min/max temp. of product in °C		<input type="text"/>
min/max housing in bar		<input type="text"/>

For your safety



- **Strictly adhere to instructions marked with this symbol**

This avoids damage to the machine and other units.



- **Take special care when carrying out operations marked with this symbol –**

otherwise danger to life.

- **Observe accident prevention regulations**

The local safety and accident prevention regulations apply unconditionally to the operation of the separator.

- **Instruction manual**

Follow only the instructions given in this manual

- **Operate the separator only in accordance with agreed process and operating parameters**

- **Maintain the separator as specified –**

in this manual

- **Carry out safety checks on the separator –**

as described in chapter "Safety precautions" in this manual

- **Liability for the function of the machine passes to the owner**

Liability for the function of the machine passes unconditionally to the owner or operator irrespective of existing warranty periods in so far as the machine is improperly maintained or serviced by persons other than Westfalia Separator service personnel or if the machine is not applied in accordance with the intended use.

Westfalia Separator AG shall not be liable for damage which occurs as a result of non-observance of the above. Warranty and liability conditions in the Conditions of Sale and Delivery of Westfalia Separator AG are not extended by the above.

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Note

1 Safety precautions

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1.1 Correct usage

The separator is designed

- in accordance with the chemical and physical properties of the product specified by the customer and
- in accordance with the method of application of the separator agreed with Westfalia Separator AG.

In particular, products not conforming to the specifications the nameplate may not be used.

Any mode of operation deviating herefrom is not proper and correct.

Prior to any intended deviation from the agreed operating mode, it is therefore imperative to obtain the consent of Westfalia Separator AG.

1.2 Safety stickers on the machine

The following warnings must be attached to the machine as self-adhesive stickers.

The stickers must always be in perfect condition.

- Clean dirty stickers.
- Replace damaged stickers.

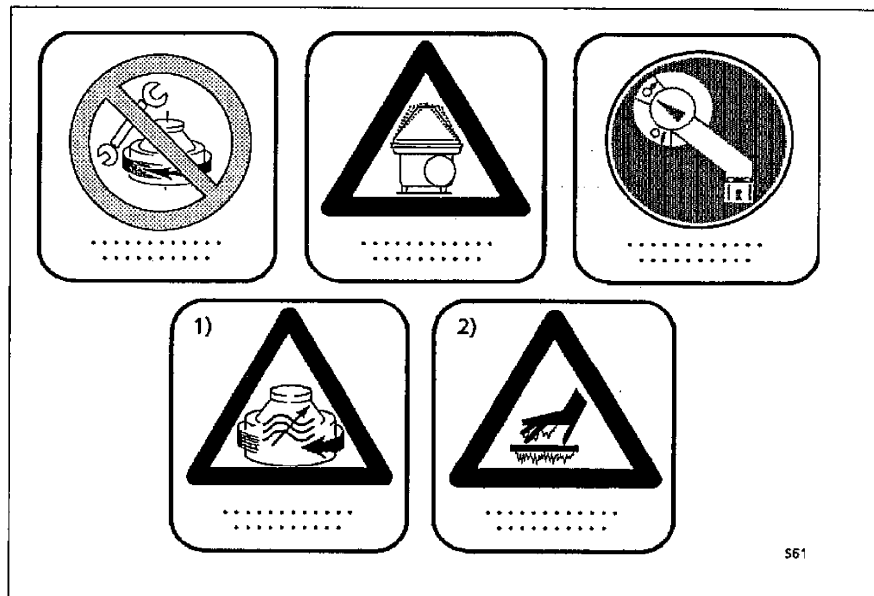
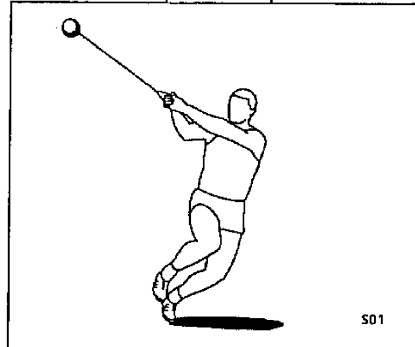


Fig. 2

- 1) Only in case of operation with frequency converter
- 2) Only in case of hot operation

1.3 Basic operating principles

Separators are used for the separation of liquid mixtures or for the separation of solids out of liquids or liquid mixtures.



High centrifugal forces are produced in the rotating bowl.

Fig. 3

Under the influence of the centrifugal forces, separation of the liquid mixture and/or ejection of the solids particles takes place most rapidly.

The specifically heavier components are displaced to the bowl periphery, whereas the specifically lighter components are displaced towards the centre of the bowl.

The high centrifugal force is produced by very high bowl speeds. On the one hand, high bowl speeds signify high efficiency, while on the other hand, they signify high material stressing of the separator.

1.4 Bowl speed and product

The max. permissible bowl speed is an important parameter when rating the separator. It depends on the chemical and physical properties of the product such as

- temperature (if higher than 100 °C or lower than 0 °C),
- density of the fluid and solid components,
- aggressiveness of the product as regards corrosion and erosion (has influence on the selection of the bowl material).

The bowl speed is determined on the basis of these parameters allowing for an adequate safety margin.

Before using a product with properties different from those stated when placing the order, it is imperative to obtain the manufacturer's approval.

1.5 Operations on the separator

The separator works reliably, provided that it is operated and maintained in accordance with our operating instructions.

Special attention must be given to:

- assembly
- starting
- shutting-down
- maintenance and servicing

1.5.1 Assembly

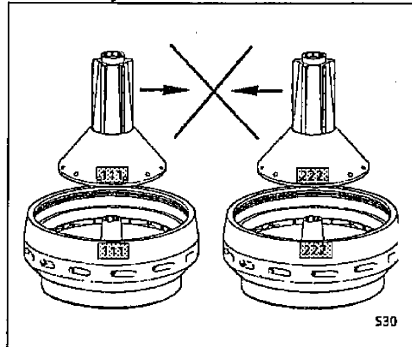


Fig. 4

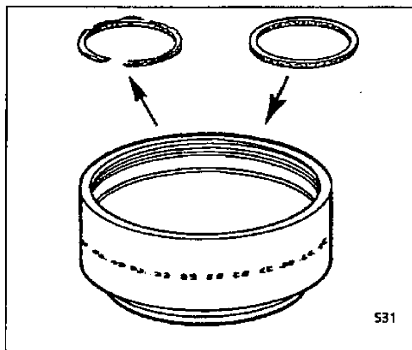


Fig. 5

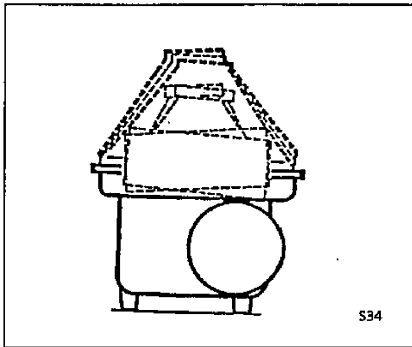


Fig. 6

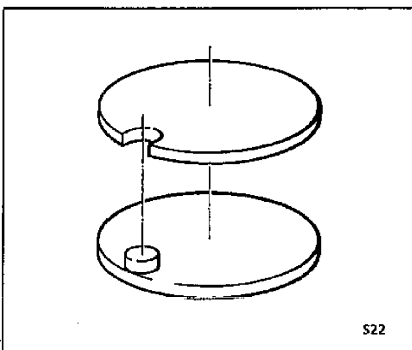


Fig. 7

- If the plant has several centrifuges, be careful not to interchange parts of different bowls since each bowl has been balanced individually. The bowl parts are marked with the serial-number of the machine or with the last three digits of the serial-number.

- Damaged parts must be replaced immediately by new parts.

- After installing certain critical spare bowl parts, the bowl must be re-balanced.

- The bowl parts are arranged in fixed positions relative to one another.
- Locking devices and alignment marks must be in perfect condition. The bowl must not be operated if these locking devices and alignment marks are not in perfect condition.

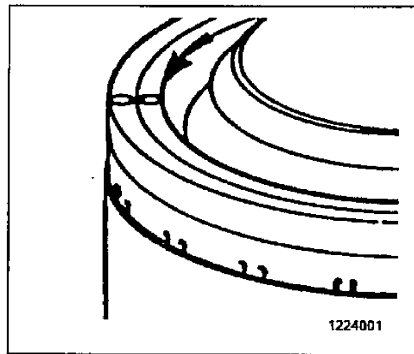


Fig. 8

- When assembling the bowl, be sure to strictly adhere to the instructions given in chapter "bowl", in order to avoid undue unbalance.
- Before starting the bowl, be sure to fit all parts.
- Tighten the bowl lock ring securely: the "O" marks on the bowl bottom or bowl top and on the lock ring must be in line with each other.

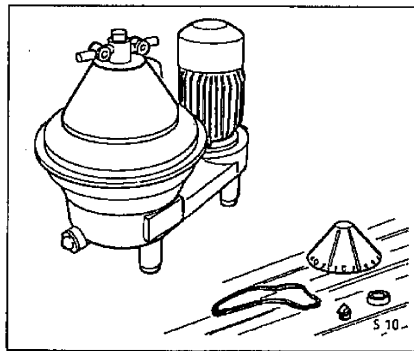


Fig. 9

- Check if the machine is completely assembled and properly installed.

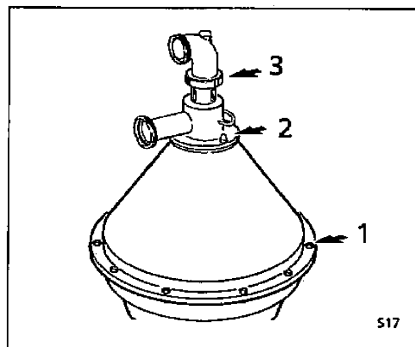


Fig. 10

- Carefully fasten hood 1, feed and discharge housing 2 and centrifugal pump 3.

1.5.2 Electrical appliances

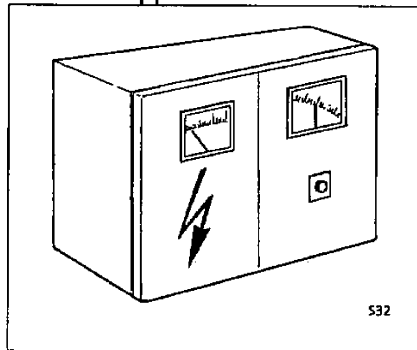


Fig. 11

- The governing accident prevention regulations apply for the electrical appliances and installations.
- The frequency and voltage of the power supply must correspond to the machine specifications.
- Carry out potential equalization.
- Observe legal regulations; e.g. in the EU:
 - Low-voltage guideline 73/23/EWG
 - Electro-magnetic compatibility 89/336/EWG.

1.5.3 Before start-up

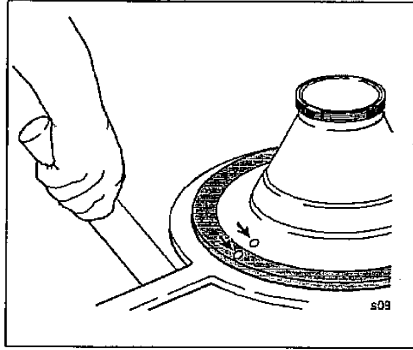


Fig. 12

- Check that the bowl lock ring has been firmly tightened.
- The "O" marks on bowl bottom or bowl top and on the lock ring must be aligned.

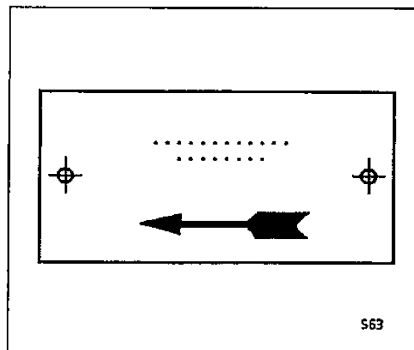


Fig. 13

- The bowl must rotate in clockwise direction (see arrow on frame or solids collector).



Fig. 14

- The separator may only be operated with protection devices conforming to EN 294. Equip solid and liquid discharges accordingly.

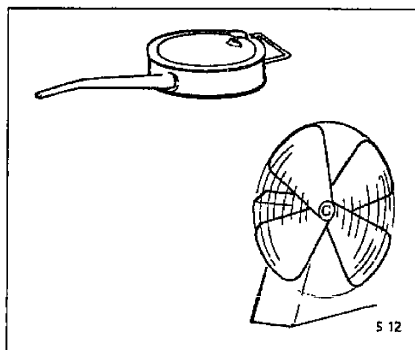


Fig. 15

- Check that the lubrication and cooling systems are serviceable.

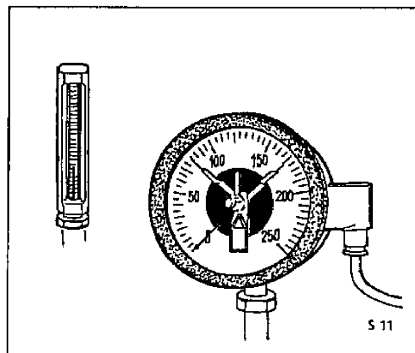


Fig. 16

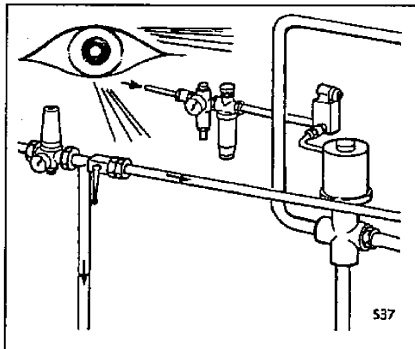


Fig. 17

1.5.4 Operation

Nameplate	
Westfalia Separator AG D-4740 Gelde (West Germany)	
WESTFALIA SEPARATOR	
Typ: _____	Masch.-Nr.: _____
Baujahr: _____	Ø D1 in mm: _____
Trommeldrehzahl in min ⁻¹ : _____	
Zulässige Dichte in kg/dm ³ des Schleudergutes: _____	
Schwere Flüssigkeit: _____	Feststoff: _____

Fig. 18



Fig. 19

- Check whether the supervisory equipment is operational and the correct limit values are adjusted.
- When hoods, concentrate collectors and vessels are pressurized, e.g. by
 - inert gas,
 - cooling,
 - steam sterilization etc.
 the pressures stated on the nameplate must not be exceeded.

- Check that the product lines are set to operation.
- Regularly check hoses for signs of ageing.
- Check sight glasses for mechanical damage.
- Replace damaged parts by parts which are as good as new.

- Refer to chapter »operation«.
- Note nameplate. The values for
 - bowl speed
 - density of the heavy liquid,
 - density of solids (centrifugally dry)
 are max. values and must not be exceeded.

- Wear ear protection.

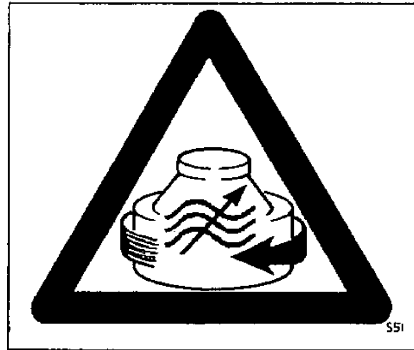


Fig. 20



Fig. 21



Fig. 22

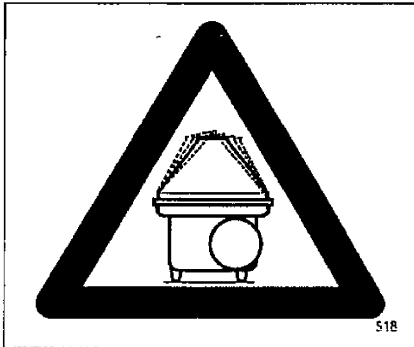


Fig. 23

In case of frequency converter operation:

- Do not under any circumstances manipulate the frequency converter to exceed the permissible bowl speed (see maker's nameplate).
- The separator may only be operated with an independent device for speed limiting.

- Do not feed product which is categorised as explosive.
- The separator must not be used in areas where explosion protection is required.

- When processing products harmful to persons, observe the pertinent safety regulations.
- Refer to the safety data sheet of the product.
- Wear protective clothing.

- Stop the separator immediately if unusual noises or vibrations occur.

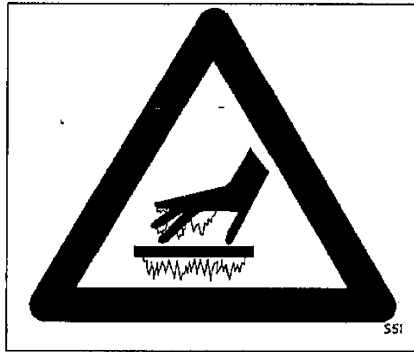


Fig. 24

Only in case of hot operation:

- Product-contacting parts such as
 - pipes and hoses,
 - hood,
 - solids collector
 reach temperatures over 80 °C.

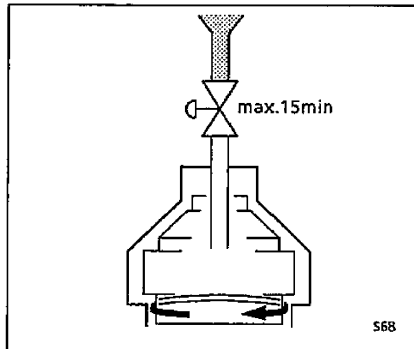


Fig. 25

- The bowl is not allowed to run without liquid supply for more than 15 minutes, as otherwise it would result in overheating of the bowl material.

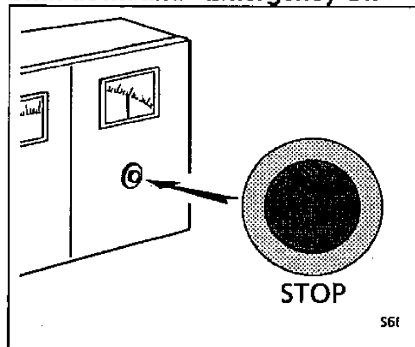
1.5.5 Shut-down and »Emergency-Off«

Fig. 26

- For shut-down refer to the chapter "operation".

1.5.6 Maintenance and repair

Unfavourable operating conditions may require shorter maintenance intervals. The factors listed below are unfavourable because they either attack the separator material directly or impair the lubrication/cooling system:

- aggressive product (chemical or physical)
- high product temperature
- product with grease decaying properties
- environment: temperature, dust and vapours

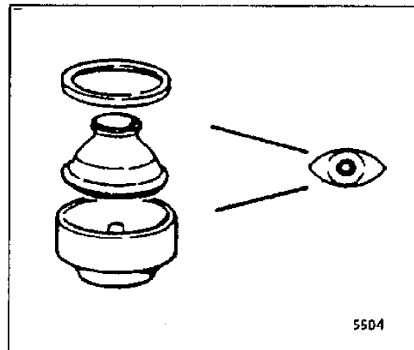


Fig. 27

Particularly stressed parts such as bearing hub, bowl hub and other bowl parts with a large outer diameter must be checked on a regular basis to ensure safe and efficient operation.

Timely maintenance and replacement of worn or damaged machine parts is essential for safe operation of the machine.



Maintenance and repair work may only be carried out by the customer to the extent as described in this instruction manual.



Maintenance and repair work not described in this manual may only be carried out by the manufacturer or by "repair shops" authorized by the manufacturer.

We, therefore, recommend in your own interest to have your separator inspected by our service engineers at regular intervals. Such inspections will keep your separator working reliable and prevent undesirable shut-downs.

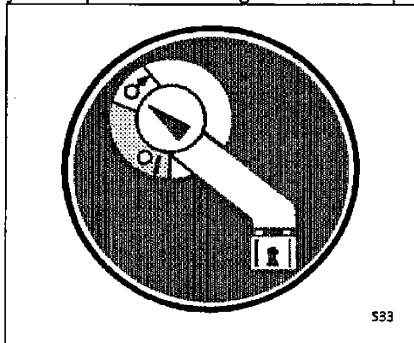


Fig. 28

Before maintenance and servicing:

- switch off all electrical appliances via the main switch,
- secure installation against unintended re-starting with locking devices.

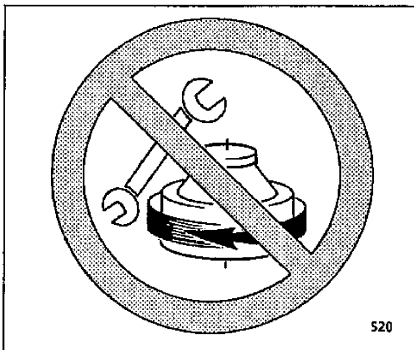


Fig. 29

- **Do not loosen any part before the bowl has come to a standstill.**
- For checking standstill refer to chapter "bowl".



Fig. 30

- Do not climb onto or stand on the machine or parts of the machine.
- Make provision for and use a sturdy working platform.

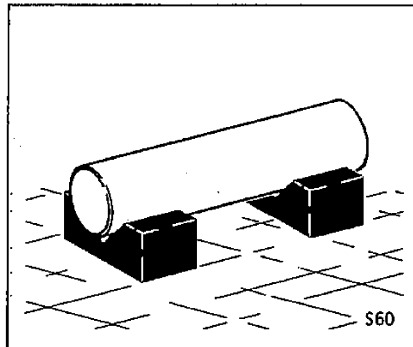


Fig. 31

- Place dismantled machine parts on a suitable base, e.g. rubber mat.
- Take steps to prevent machine parts from overturning and rolling away.

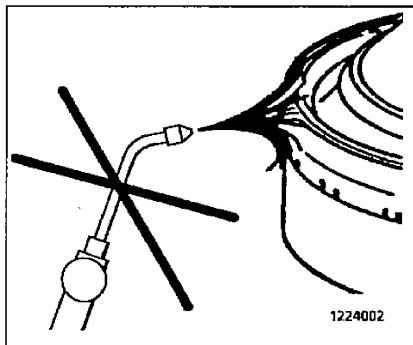


Fig. 32

- Do not heat bowl parts with the naked flame.
- Bowl parts must never be welded. This also applies for hood and solids collector parts of steam-sterilizable separators.
- Even during cleaning the bowl parts the temperature must not exceed 100 °C.

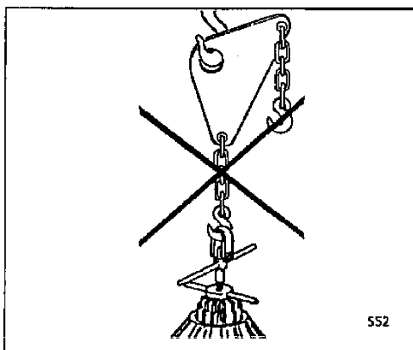


Fig. 33

- Load-carrying equipment such as lifting devices for
 - bowl or distributor,
 - chains etc.
 may only be used for work routines as described in this instruction manual.
- Do not use damaged or incomplete load carrying equipment.

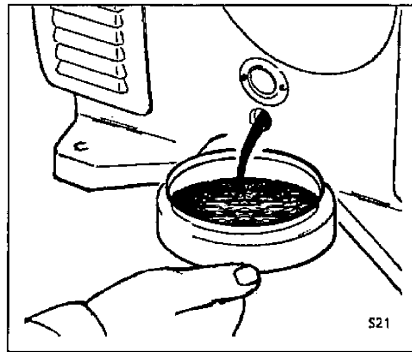


Fig. 34

- Collect dripping oil to prevent danger of slipping or product infection.
- When handling waste oils note:
 - They can be injurious to health, depending on their chemical composition.
 - Waste oil must be disposed of in accordance with local regulations.

1.6 Corrosion

Corrosion can also affect bowl parts made of stainless steel. This corrosion can be flat-spread or pit- or crack-shaped and merits special attention.

Corrosion on stainless steel bowl material should be examined thoroughly and documented.

Flat-spread corrosion can usually be measured (reduction of wall thickness)

Pit- or crack-shaped corrosion cannot be measured without the risk of damage. At the initial stage pit-shaped corrosion is generally caused by chlorine ions.

Depending on the stressing of the part, pit-shaped corrosion can result in crack-shaped corrosion.

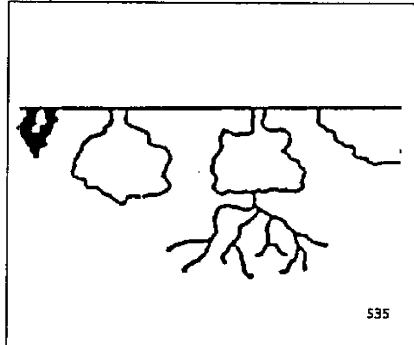


Fig. 35

Possible formation of pit-shaped corrosion.

Such pittings can only be investigated by a materials expert.

In case of crack-shaped corrosion attack with or without superposed flat-spread and pit-shaped corrosion on main bowl components, **the machine must be shut down immediately.**

Contact your nearest Westfalia Separator AG representative for a thorough examination.

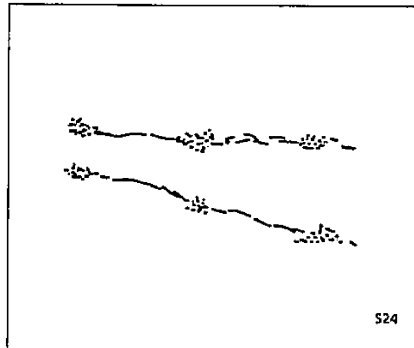


Fig. 36

Pittings

Pittings which are close together or form a linear pattern can signify crack formation beneath the surface.

Such pittings should be investigated by a materials expert.

1.7 Erosion

Erosion is caused by solid particles in the process liquid.

These solid particles grind marks into the surfaces with which they come into contact.

The following factors favour the occurrence of erosion:

- hard solids particles
- high throughput capacities

The first signs of erosion should be carefully observed and documented. Erosion can deepen rapidly, thereby weakening the bowl material.

Contact your nearest Westfalia Separator representative for a thorough examination. Information on the nature of the damage can be provided by photos, plaster casts or lead molds.

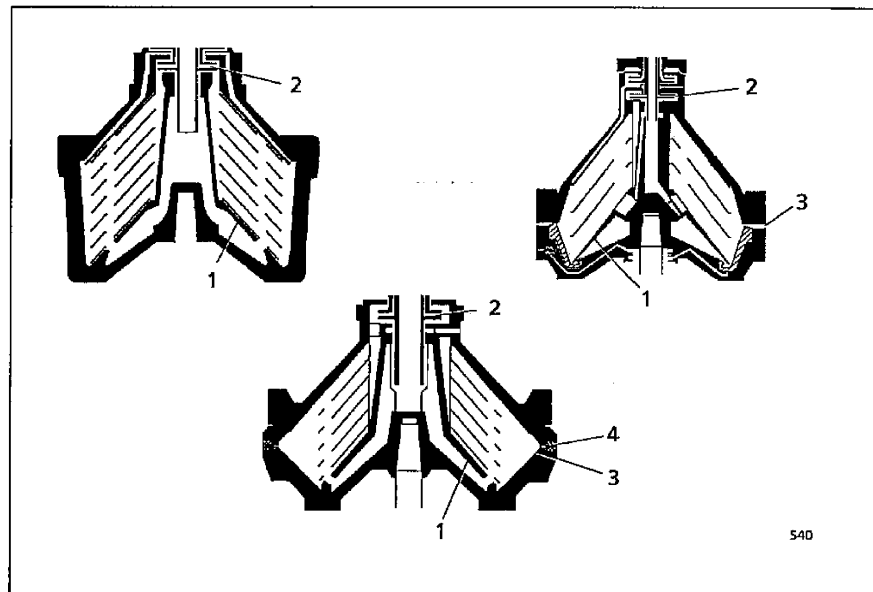


Fig. 37

The surfaces most susceptible to erosion are:

- 1) the bottom of the distributor, the rising channels and the ribs,
- 2) the centripetal pump (cavitation),
- 3) all surfaces in the area of the solids discharge ports,
- 4) the nozzles.

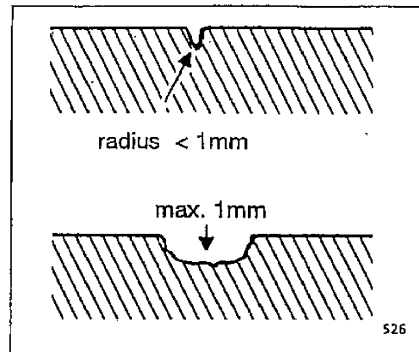
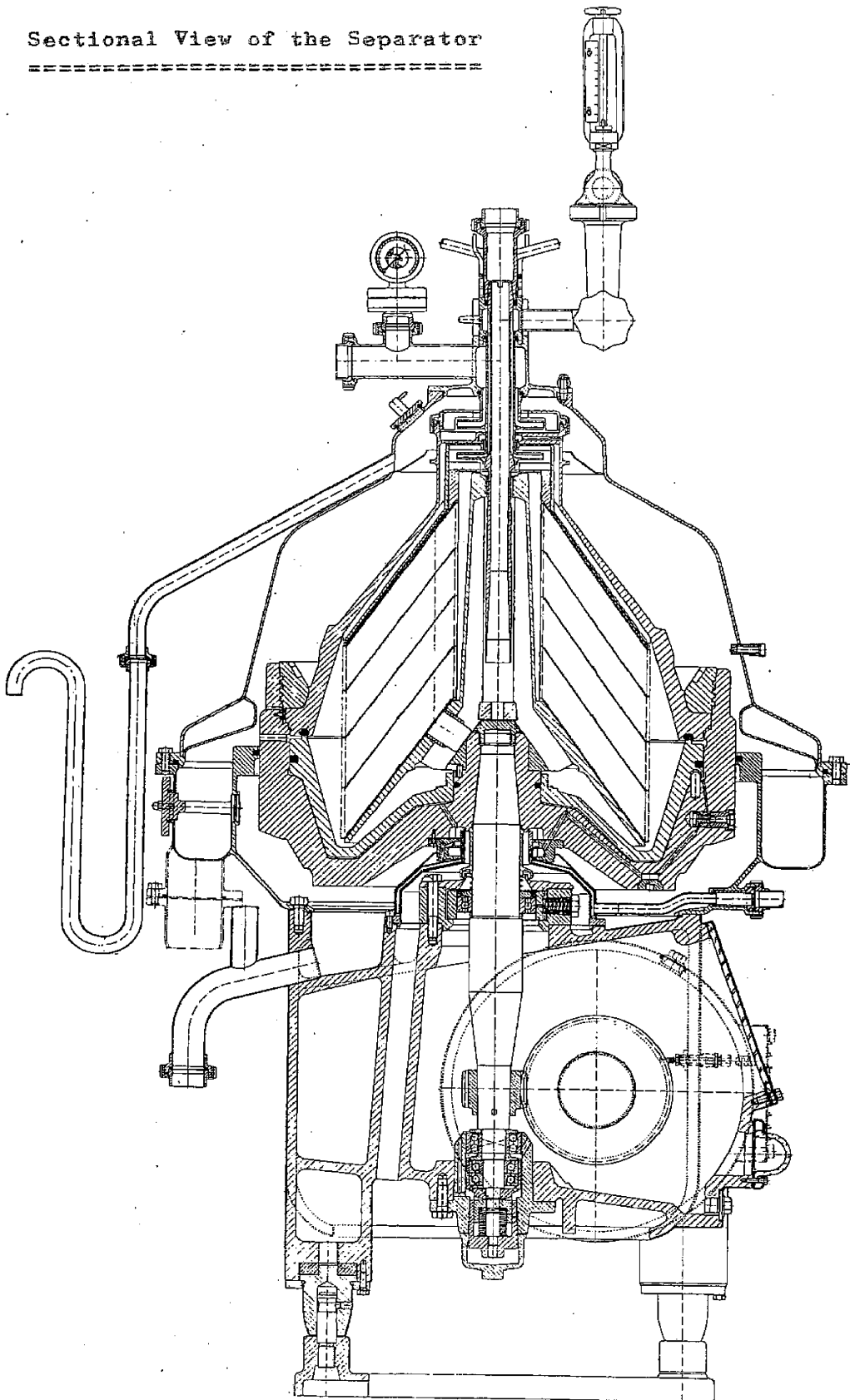


Fig. 38

Signs of erosion which you should immediately report to your nearest Westfalia Separator representative:

- The bottom of the erosion mark has a radius smaller than 1 mm (large notch effect).
- The depth of erosion mark exceeds 1 mm at the deepest point.

Sectional View of the Separator





WORKING INSTRUCTIONS

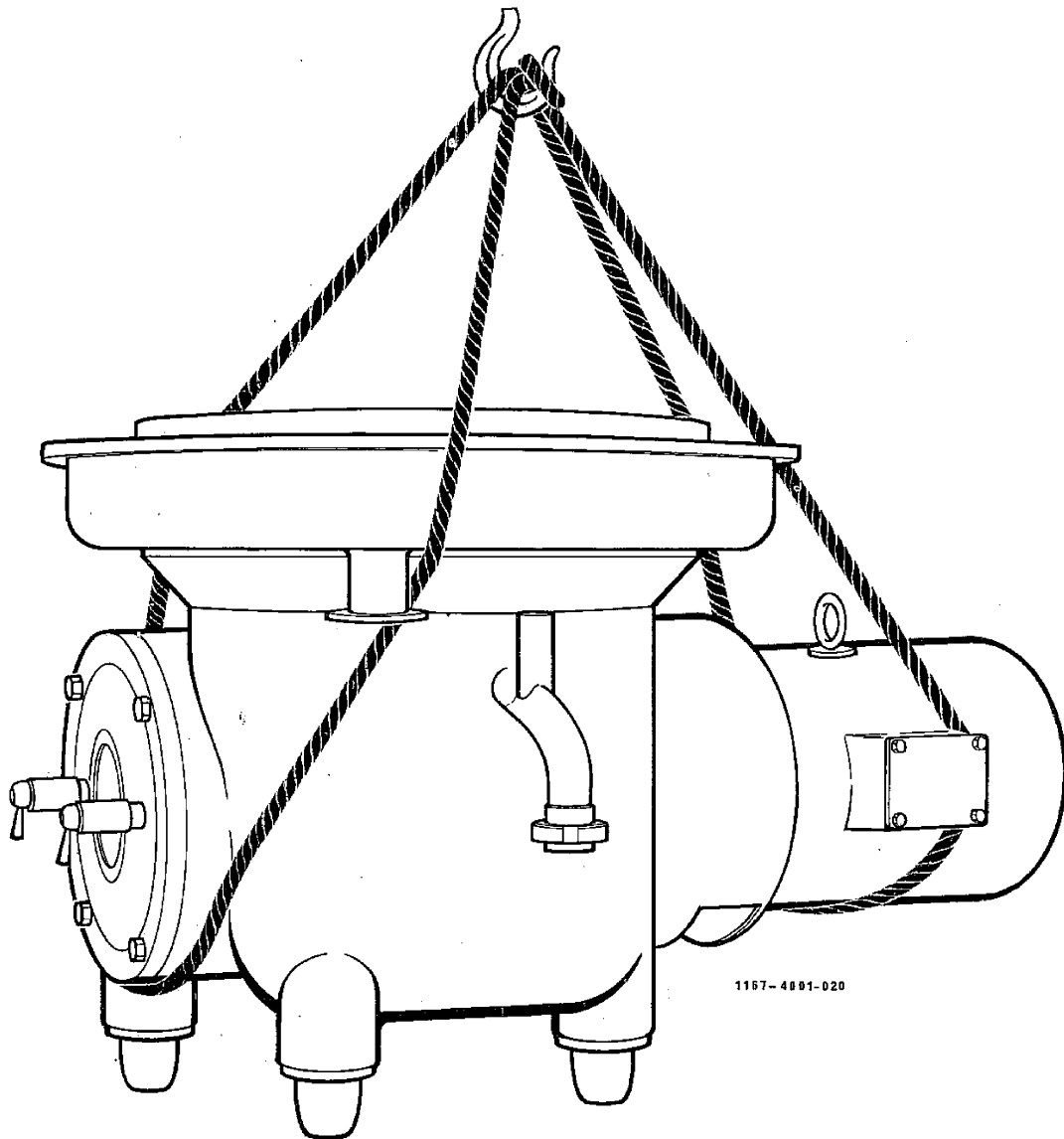
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1. Installation

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1.1. Transport

Suspend the separator as shown in fig. 1/1. To prevent ropes from slipping, wind part of a rope around the crane hook. When lowering the separator, make sure it touches down gently.



Weight: 1000kg

Fig. 1/1

1.2. Installation

When installing the separator make sure that sufficient room is available (at least 15") for mounting and removing the motor and for removing the horizontal drive shaft which is to be pulled out towards the brake side.

Do NOT install a shut-off device in the line which will be connected to the operating-water discharge line 5a-c (fig. 13/1). The line should have 2" I.D. It should have sufficient fall and must NOT be too long to allow the discharging operating-water to flow off freely, since otherwise the water will rise and enter the upper section of the frame, resulting in slowing-down of the bowl.

The supply line to the operating-water connection should have 1" I.D., the operating-water pressure should be approx. 21 psi. The pressure must not fluctuate by more than 7 psi. Operating-water consumption: 50 litres/h.

For mounting and removing the bowl parts, a 500 kg hoist (minimum lifting height 2.8m; see installation plan) will be indispensable. On request a WESTFALIA Swing Crane can be supplied.

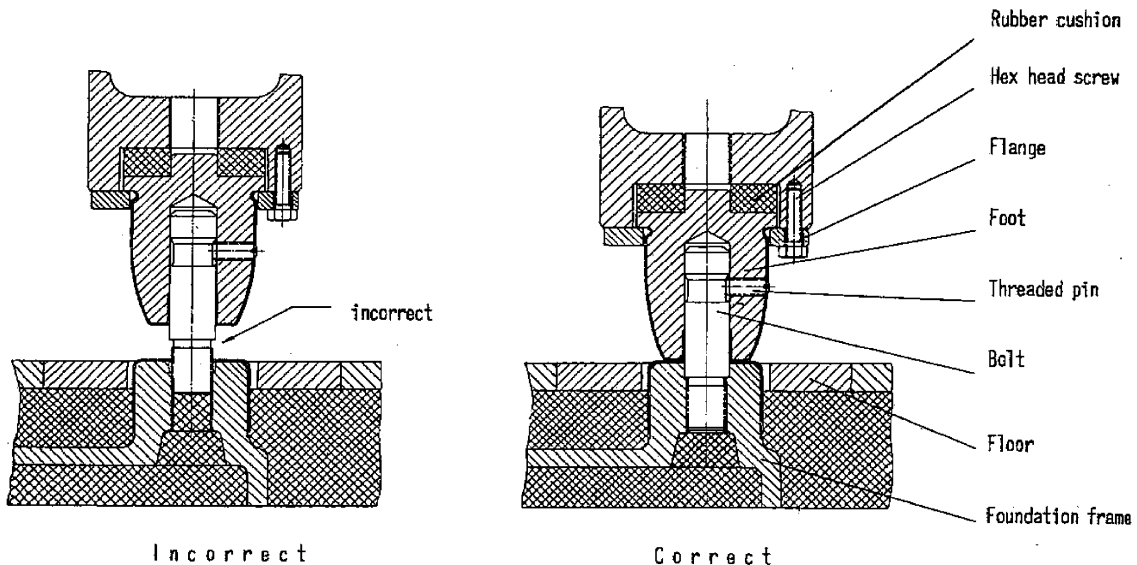


Fig. 1/2

Screw bolts into the four mounting blocks of foundation frame; make sure they are tight. Embed the foundation frame in the floor so that the mounting blocks of the frame protrude above the plane of the floor by about 5 mm = 0.2". Fill up the space below the foundation frame with concrete. Make sure that the mounting blocks are absolutely level and grout the frame with concrete, inside and outside. To accelerate setting of cement, commercial rapid binding agents may be used.

By means of flanges and hex head screws fasten feet with fitted-on rubber cushions to separator frame. Then lift the separator frame with its feet onto the bolts of the foundation frame and tighten the threaded pins with a wrench.

2. Lubrication

=====

2.1. Lubrication of bearings and gear parts

All bearings and gear parts are splash lubricated from a central oil bath.

OIL LEVEL

Before initial start-up of separator, fill gear chamber with oil. To do this, remove upper sight glass and fill in oil until oil level is slightly above middle of oil level sight glass. About 5.5 litres of oil are required for one filling. During operation oil level must never be allowed to sink below middle of oil level sight glass; refill oil when necessary.

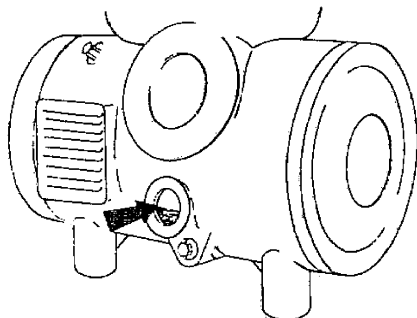


Fig. 2/1

OIL CHECK

Check oil level once a week. From time to time check if oil contains water. To do this, loosen oil drain screw and allow a small amount of oil to drain. An immediate oil change becomes necessary when the oil shows a milky colouring (emulsification).

OIL CHANGE

Make first oil change after about 250 operating hours; then change oil every 750 operating hours. However be sure not to wait longer than 6 months to change the oil.

Each time when carrying out oil change, thoroughly clean gear chamber and flush with thin-bodied oil, prior to filling in new oil. Remove all metal particles from inner walls and corners of the gear chamber. Do NOT use fluffy cleaning rags or cotton waste. The sight glass should also be cleaned, as a layer of oil will probably have deposited on the inner side of the glass and this is easily mistaken for the oil level.

LUBRICATING OIL

As lubricating oil use only a gear oil designated

C-LP 114 (according to DIN 51502)

or designated

ISO VG 220 (according to ISO/DIS 3448).

The lubricating oil shall meet the following requirements:

- 1) Viscosity: 114 ± 8cSt at 50°C, (220 ± 22 cSt at 40°C)
- 2) Additives:
 - a) additives giving increased protection against corrosion and increased resistance to aging, - with properties preventing corrosion on steel according to DIN 51355/B, degree of corrosion 0, Corrosive effect on copper according to DIN 51759/100 A3, degree of corrosion 1.
 - b) additives for decreasing wear and increasing the load-carrying capacity. The "FZG" gear rig test according to DIN 51354 as well as the test according to A/16.6/90, load grade > 12, must have been passed.
- 3) Demulsifying behaviour according to DIN 51599: < 60 minutes.

The gear oil designated "Separator lubricating oil C-LP 114" which has been extensively investigated by us meets the above requirements and should preferably be used. For the order number refer to page 20/1 of the parts list.

IMPORTANT! Do NOT use motor vehicle lubricating oils, since they are likely to emit disturbing odours.

2.2. Lubrication of the motor bearings

For lubrication of the motor bearings refer to the instructions of the motor manufacturer (see plate attached to the motor).

3. Motor Connection

=====

3.1. Three-phase AC motor, 22 kW

The separator is driven by a flange type motor via a fluid clutch. The motor is started by means of an automatic star-delta switch. Switching over from star to delta connection takes place after three to four seconds.

Motor protection is ensured by PTC resistor type temperature feelers incorporated in the winding of the motor. They have to be connected to an appropriate tripping unit. External voltage higher than 2.5 volts must not be applied to the terminals of the temperature feelers. When testing for continuity, do NOT use a test lamp but only an ohmmeter. The measuring circuit line (between tripping unit and motor) should be laid separate from other lines.

The starting current of the motor can reach 1.7 times the value of the rated current. Dimensioning of switches, wiring, and fuses should, therefore, be based upon the starting current and not on the rated current.

Voltage V	50 Hz		Minimum section of lead-in wires mm ²	Rated current of fuses Amps
	Rated Current Amps			
220	73.5		35	160
380	42.5		16	80

3.2. Direction of rotation of the bowl

IMPORTANT: The bowl must rotate in clockwise direction when looked at from above. The direction of rotation of the bowl is correct when the square-head screw on motor shaft end rotates in direction of arrow. The direction of rotation is reversed by interchanging two lead-in wires.

3.3. Speed and starting time of the bowl

The bowl speed is 4500 rpm. It is indicated by the RPM meter (see 3.4). Starting of the bowl takes about 10 minutes.

3.4. RPM Meter

The RPM meter monitors the bowl speed. It consists of a proximity switch, a measuring instrument, and an indicating instrument with a limit value relay.

If the bowl speed drops below 4400 rpm because the clutch is defective or the bowl has opened irregularly, the milk pump is switched off automatically and an alarm is given. If the bowl fails to reach the operating speed of 4500 rpm within the pre-set starting time of 11 minutes, the RPM meter prevents starting of the milk pump and triggers a signal.

3.5 Interlock device: see page 23/1.

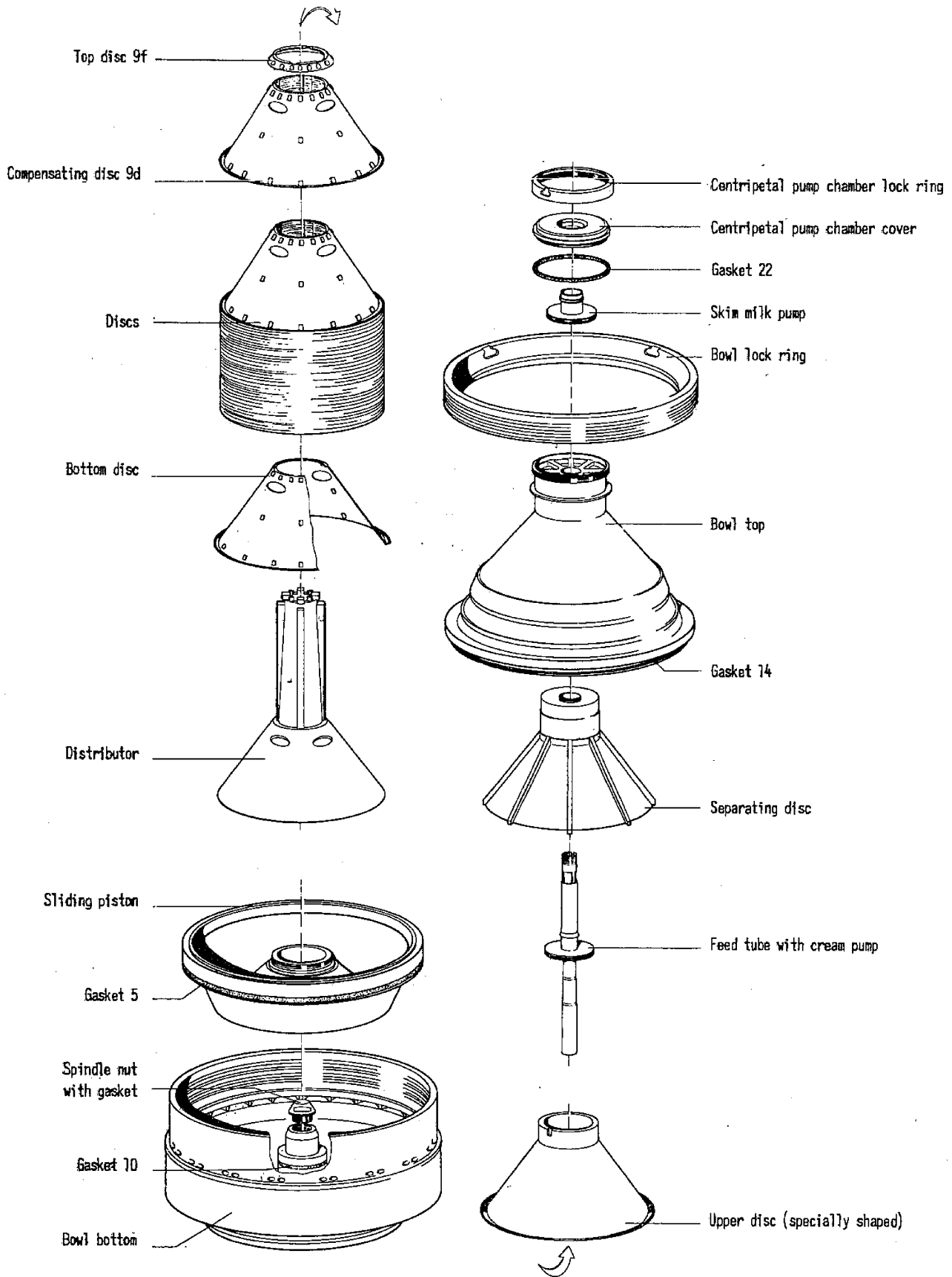


Fig. 4/1
 Component Parts of the Bowl in the Order
 of Assembly.

4. Bowl and Feed and Discharge Connections

4.1. Assembly of the bowl (for tools refer to page 20/2)

Before assembling the bowl, make sure that all contact surfaces of the bowl parts are clean.

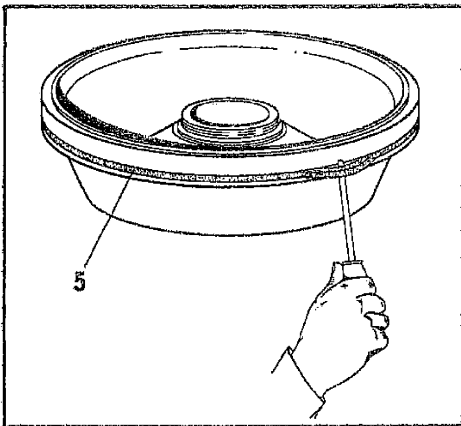
When assembling the bowl, make sure that the "O" marks of all bowl parts are in line.

If the plant has several centrifuges, be careful not to interchange parts of different bowls, since each bowl has been balanced individually. The main parts of the bowl are marked with the last three digits of the Serial-Number of the separator.

- 1) Oil the upper part of the worm spindle (thread, cone and cylindrical guide surface for spindle cap). It must be possible to move the spindle cap easily up and down on the spindle. Then clean and wipe dry the conical part of the spindle with a smooth rag. Carefully clean the inside of the bowl hub as well to assure proper fitting.
- 2) Use jack 436 to place bowl bottom 7 onto spindle.
- 3) Insert gasket 16a in spindle nut 16.
- 4) Tightly screw on spindle nut. (left-hand thread), using a wrench.
- 5) Fit gasket 10 into hub of bowl bottom.

- 6) Thoroughly clean groove in sliding piston 4 for gasket 5 and apply a thin film of grease.

In case the gasket is new and a bit too tight, stretch it out equally all the way around until its outer diameter is almost equal to the outer diameter of the groove in the sliding piston.



Then put the gasket into the groove of the sliding piston. Stick a screwdriver under the gasket and run it around the sliding piston two or three times (see fig. 4/2). Then tap the gasket back into its groove with a rubber hammer.

The gasket is now equally stretched all the way around and assures best sealing effect during operation.

Fig. 4/2

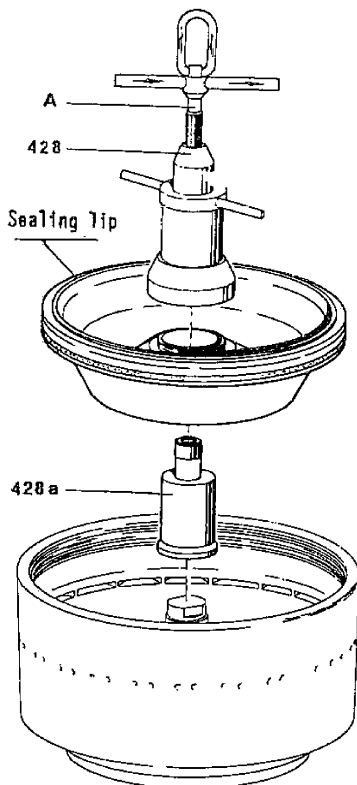


Fig. 4/3a

- 7) Fig. 4/3a: Apply a thin film of the special paste supplied to guide surfaces of sliding piston and bowl bottom. Place pressure piece 428a on to bowl hub: arresting pins of bowl bottom must catch into holes of pressure piece. With the aid of jack 428, install sliding piston in such a manner that "O" marks of bowl bottom and piston are aligned. By turning jackscrew "A" in counter-clockwise direction, lower sliding piston slowly until arresting pins of bowl bottom catch into holes of sliding piston.

CAUTION: Be sure not to damage sealing lip of sliding piston.

- 8) Use device 434 to install distributor 11 into bowl bottom. Make sure that the three arresting pins of bowl bottom catch into recesses of distributor. The "O" marks of both parts must be in line with each other.
- 9) Stack discs 9a-c onto neck of distributor in numerical order, disc No. 1 on bottom.
- 10) Place on compensating disc 9d (with spacers of different height), and spacer disc 9f.

IMPORTANT: If a spare disc has to be added to obtain the necessary pressure in the disc stack, be sure to place it below compensating disc 9d. Do NOT place it between compensating disc and spacer disc 9f.

- 11) Place on upper disc 19 (specially shaped).
- 12) Install feed tube with fitted-on cream pump into distributor neck.
- 13) Install separating disc 18. The "O" marks of separating disc and bowl bottom must be in line with each other.
- 14) Use device 427 to place bowl top 17 with inserted gasket 14 onto bowl bottom. Make sure that arresting piece of bowl bottom catches into groove of bowl top. The "O" marks of both parts must be aligned.

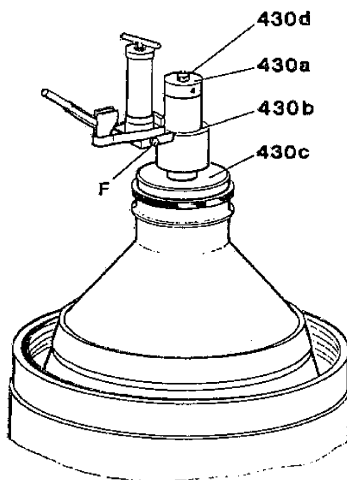


Fig. 4/3b

- 15) Carefully clean, wipe dry and grease threaded areas of bowl bottom and of bowl lock ring 8 as well as the contact surfaces, to prevent seizing of the threads. For greasing use the supplied lubricating paste; apply a thin film only.
- 16) Before screwing in the bowl lock ring, compress the disc stack by means of compressing device 430 (fig. 4/3b) in the following manner (see also sect. 4.6):
- Place disc 430c onto the bowl top.
 - Screw bolt 430d down into the distributor until there is a clearance of 32 - 35 mm between end thread of bolt and upper edge of pump tube (see fig. 4/10).
 - Insert hydraulic compressing device 430b in centering recess of disc 430c.
 - Screw on threaded ring 430a and tighten it so that its upper edge is flush with end thread of bolt 430d.

CAUTION: To avoid damage to the threads due to pressing, the threaded bolt must be screwed in and the threaded ring screwed on all the way. If the threaded ring cannot be screwed down completely then the piston and the cylinder of the compressing device prove to be too far apart. To bring them back into their starting position, loosen screw "F" by two turns and move the pump lever to its lowest position. Now you can screw down the threaded ring, thereby bringing piston and cylinder into proper position.

- e) Check to be sure that all screw connections of the compressing device are tightened securely and that return duct of check valve is closed by means of screw "F".
Before the first use of the compressing device fill oil container of pump with oil and de-aerate the hydraulic chamber (see 4.6).
- f) Actuate lever of piston pump until the pressure gauge indicates a pressure of 330 - 360 bar. If the maximum pressure is not attained and oil flows out of the stroke limiting hole, then bolt 430d has not been screwed far enough into the distributor. The compressing device is only ready for use again when bolt 430d and threaded ring 430a have been brought back into the position as described under 16 a-d on page 4/3.
While compressing the disc stack make sure that arresting piece of bowl bottom snaps into groove of bowl top and that bowl top does not become tilted.
- 17) Use annular wrench 425 and lifting device 431 to place bowl lock ring onto bowl bottom (see fig. 4/6). Screw in the lock ring (left-hand thread) with the aid of the annular wrench (without hitting the wrench handle with a mallet) until the "0" marks on ring and on bowl bottom are 3 to 5 cm apart. Then hit wrench handle with mallet 405 to obtain "0" mark alignment. ~~Loosen the screws which fasten annular wrench to bowl lock ring, then remove the wrench. Be sure to close the tap holes in the bowl lock ring by screwing in threaded pins.~~
IMPORTANT: If the bowl lock ring can be tightened by hand with the aid of the annular wrench so that the distance between the two "0" marks is less than 3 cm, a spare disc has to be added because the pressure in the disc stack has slackened (see sect. 4.1, No.10). If the distance between "0" marks is more than 5 cm, check if all bowl parts are properly locked in place. If the pressure in the disc stack is too high, it can be reduced by greasing the spacers of the discs (e.g. with cream).
- 18) Move pump lever down as far as it will go to prevent it from jumping back. Only then loosen screw "F" to enable the oil to return from the hydraulic cylinder into the oil container. The compressing device can now be removed from the bowl.
- 19) Install skim milk pump.
- 20) Insert gasket 22 in centripetal pump chamber cover 21.
- 21) Install centripetal pump chamber cover 21; make sure that arresting pin of bowl top catches into recess of centripetal pump chamber cover.
- 22) Screw on centripetal pump chamber lock ring 23 (left-hand thread) and tighten it by hitting handle of annular wrench 426.
- 23) Check if bowl can be turned by hand.

4.2. Assembling the feed and discharge connections

- 1) Fasten lifting device 435 (fig. 20) to hood by means of cap nuts 4lh. Use hoist to place hood on sediment collector in such a manner that "0" marks of sediment collector and hood are in line. Connect flush lines. Fasten hood to sediment collector with hex head screws 4lb.
- 2) Place skimmilk discharge with inserted gaskets 2d and 2u (fig.18/1) on to hood and fasten it with cap nuts 4lh.
- 3) Place cream discharge with inserted gaskets 7a,b,d into skimmilk discharge.
- 4) Move locking device of handle connection piece upwards. Screw on handle connection piece (left-hand thread) and tighten it firmly. While tightening, block feed tube with wrench 429 (fig. 20). Then turn locking device until it snaps in. Handle connection piece is now properly locked in position.
- 5) Connect feed and discharge lines.

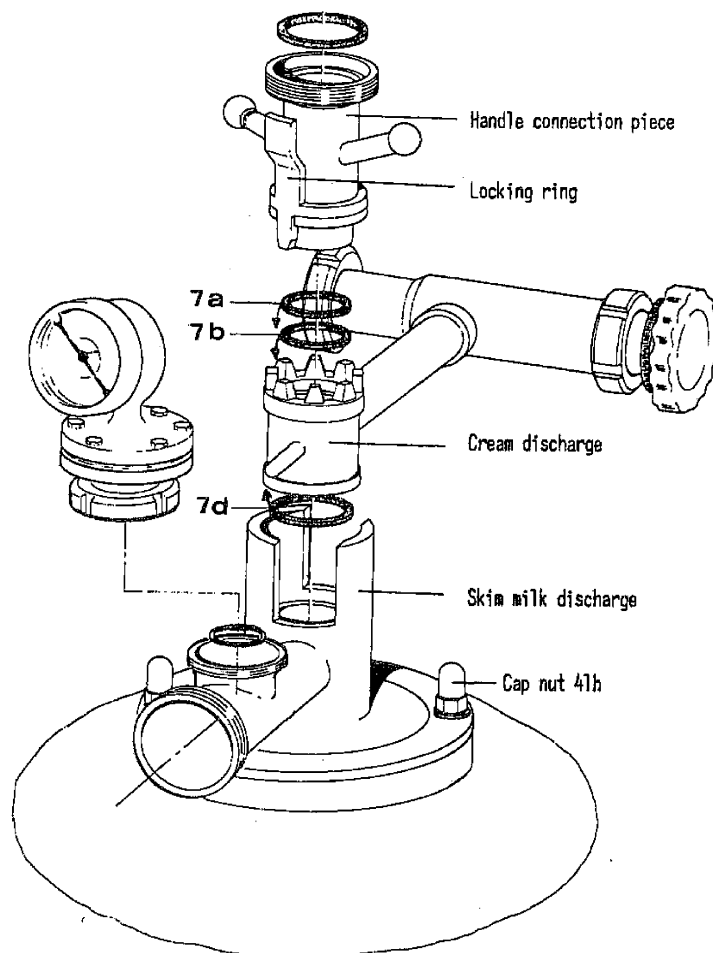


Fig. 4/4

4.3. Removing the feed and discharge connections Dismantling the bowl

CAUTION: To avoid accidents, do NOT loosen any part of the separator or of the feed and discharge connections before the bowl has stopped completely.

Wait until the worm wheel has ceased rotating so that lubricating oil no longer splashes against the sight glass. You can then be sure that the bowl has stopped rotating.

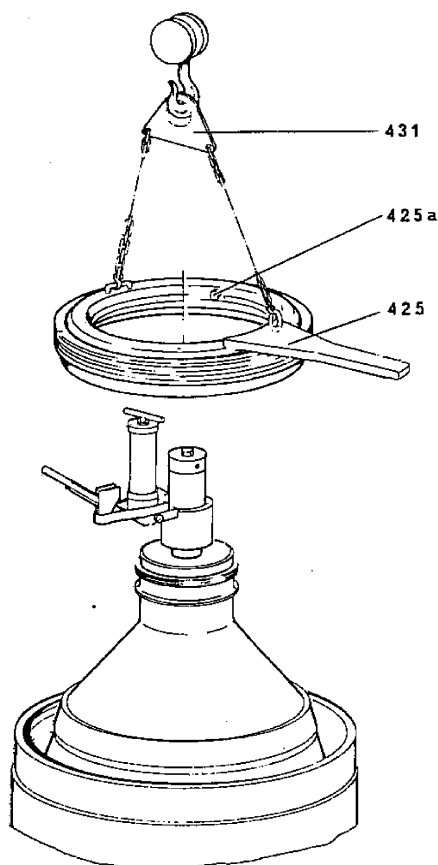
For removal and dismantling proceed in reverse order of assembly (see 4.1 and 4.2) and according to the following instructions:

Handle bowl parts with care.

Be sure to replace worn gaskets.

Before opening the bowl release the brakes by turning the two handles in clockwise direction.

After having unscrewed the small lock ring and removed the centripetal pump chamber cover and the upper centripetal pump, compress the disc stack by means of the hydraulic compressing device (see 4.1 No. 16 a-f) in order to facilitate loosening of the lock ring.



Unscrew bowl lock ring (left-hand thread) with annular wrench 425. Loosen the ring by hitting the wrench handle with mallet 405. Then remove disc stack compressing device (see 4.1 No. 22).

Fig. 4/6

Lock annular wrench 425 by screwing hex head screw 425a into groove of bowl lock ring. Then lift off annular wrench and lock ring with the aid of device 431.

Fig 4/6

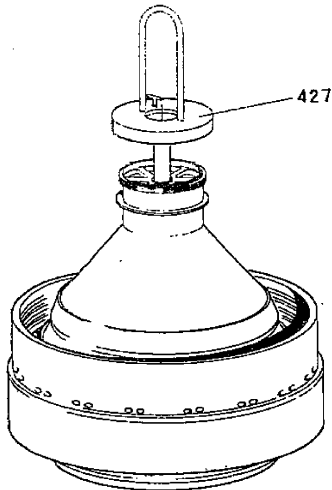


Fig. 4/7a:

Screw device 427 onto bowl top and, by means of a hoist, remove bowl top from bowl bottom.

If the separating disc is stuck in the bowl top, rap bowl top with a copper or light metal hammer until the separating disc comes loose. Do NOT let it drop on the floor.

If the separating disc cannot be detached in this manner, proceed as follows: Place the bowl top on a wooden surface. Pass a brass mandrel through the outer holes in the upper part of bowl top and place it on the outer edge of the separating disc. Detach the separating disc by slightly hammering the mandrel. Do NOT place a mandrel on the inner edge of the separating disc.

Fig. 4/7a

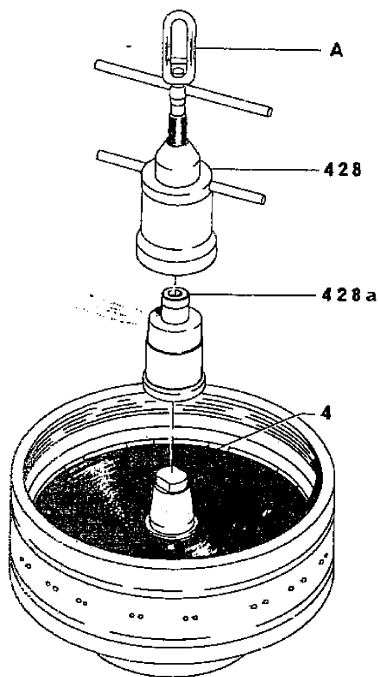


Fig. 4/7b:

Place pressure piece 428a on bowl bottom in such a manner that arresting pins of bowl bottom catch into holes of pressure piece. Screw jack-screw 428 onto sliding piston. Turn jack-screw in clockwise direction in order to pull the sliding piston off the bowl bottom. Then lift out the sliding piston.

Fig. 4/7b

4.4. Removal and installation of Polyamid gasket 15 (fig. 19)

4.4.1. Removing the Polyamid gasket from the bowl top

Remove Polyamid gasket from groove of bowl top with the aid of the drift pin supplied with the machine: Introduce the drift pin into the holes which are equally distributed around the bowl top and hammer on to the pin until the gasket becomes loose.

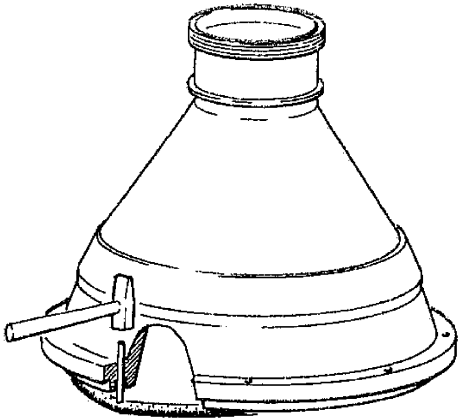


Fig. 4/8a

4.4.2. Installing the Polyamid gasket into the bowl top

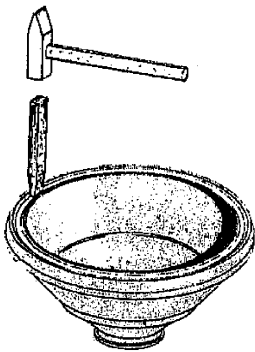


Fig. 4/8b

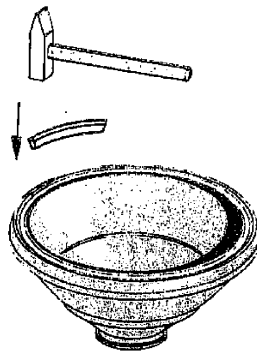


Fig. 4/8c

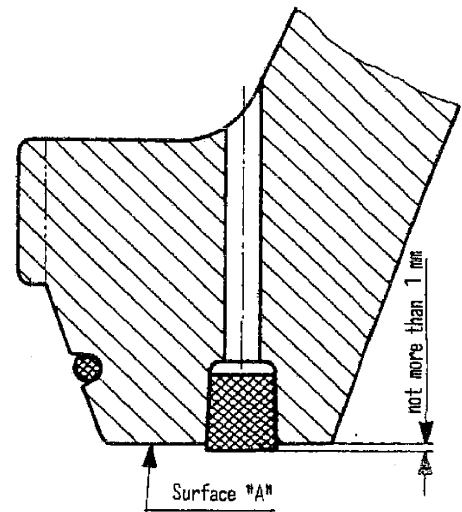
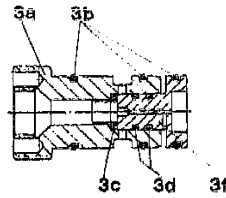
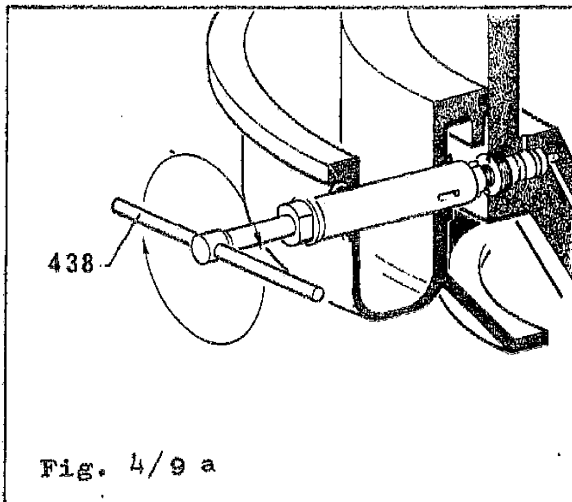


Fig. 4/8d

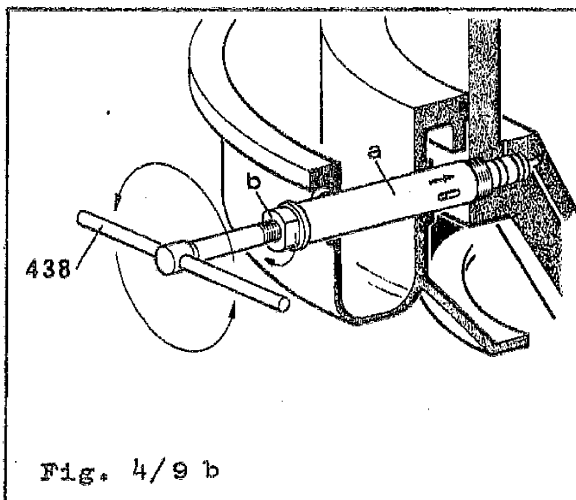
- 1) Keep gasket for about 5 minutes in approx. 80°C hot water to warm it up.
- 2) Wipe gasket dry.
- 3) Insert gasket (with its narrow side facing the bowl top) into the clean groove of bowl top. Place a piece of hard wood (fig. 4/8b) or a piece of the old Polyamid gasket (fig. 4/8c) on the new gasket and hammer the gasket evenly into the groove until its sealing surface protrudes from surface "A" of bowl top by not more than 1 mm (fig. 4/8d).

4.5. Removing the piston valve

Remove piston valve assembly 3a-f once a month for cleaning. On this occasion check the gaskets and replace them, if necessary.

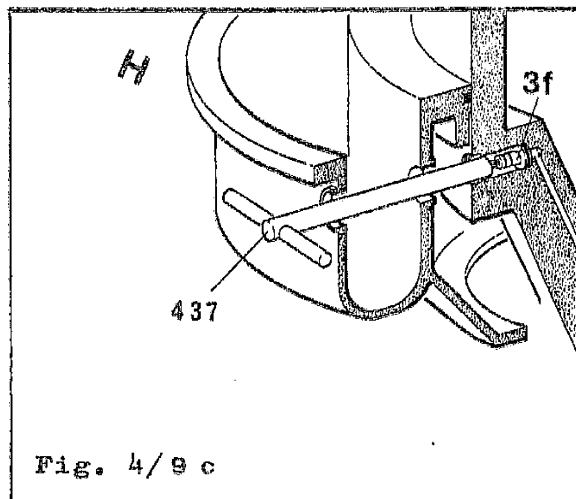


Screw wrench 438 into piston valve.



Introduce pins of bush a of wrench 438 into boreholes of valve. Tighten nut b. Then unscrew piston valve by means of wrench 438.

Before installing the valve, moisten gaskets 3b and grease threaded area. Then screw in valve as far as it will go. However, be sure not to screw it in too tightly.



Screw wrench 437 into valve piston 3f and withdraw piston from bowl bottom.

4.6. Hydraulic Disc Stack Compressing Device

4.6.1. Operating principle

By means of oil pump A oil is pumped under high pressure into hydraulic chamber B. Due to the increased pressure in this chamber, piston D is moved downwards. Cylinder C is held by threaded ring 430a, screwed onto bolt 430d. The lower end of the bolt is screwed into the distributor.

When the piston moves downwards, pressure is exerted on the bowl top, via disc 430c, resulting in compression of the disc stack.

4.6.2. Oil pump

Oil pump A is capable of producing a maximum pressure of 400 bar. It consists of oil container A2, pump head A1 and check valve A4. The holding capacity of the oil container is 350 cm³.

Filling in oil: Before the first use of the compressing device, unscrew cover A3 and fill the container with oil. Then replace the cover and screw it on tightly.

De-aerate the pressure chamber B. To do this, loosen vent screw E and actuate the pump until oil escapes through the vent hole. Then re-tighten the vent screw.

4.6.3. Hydraulic fluid

As hydraulic fluid, the lubricating oil furnished with the separator and designated C-LP 114 (106-122 cSt/50 °C) can be used.

4.6.4. Pressure gauge

The hydraulic pressure exerted upon the disc stack is indicated by pressure gauge G (indicating range 0 - 600 bar) attached to check valve A4.

The pressure required to compress the disc stack ranges between 330 - 360 bar. It may be higher than 360 bar, but must **not** be lower than 330 bar.

The maximum permissible pressure is 390 bar.

4.6.5. Stroke limiting hole

To prevent damage to the compressing device in the event of incorrect mounting the hydraulic unit is provided with a stroke limiting hole H. If bolt 430d and threaded ring 430a have not been screwed down properly (see sect. 4.1, no. 16a-d) the oil in hydraulic chamber B will escape through this hole.

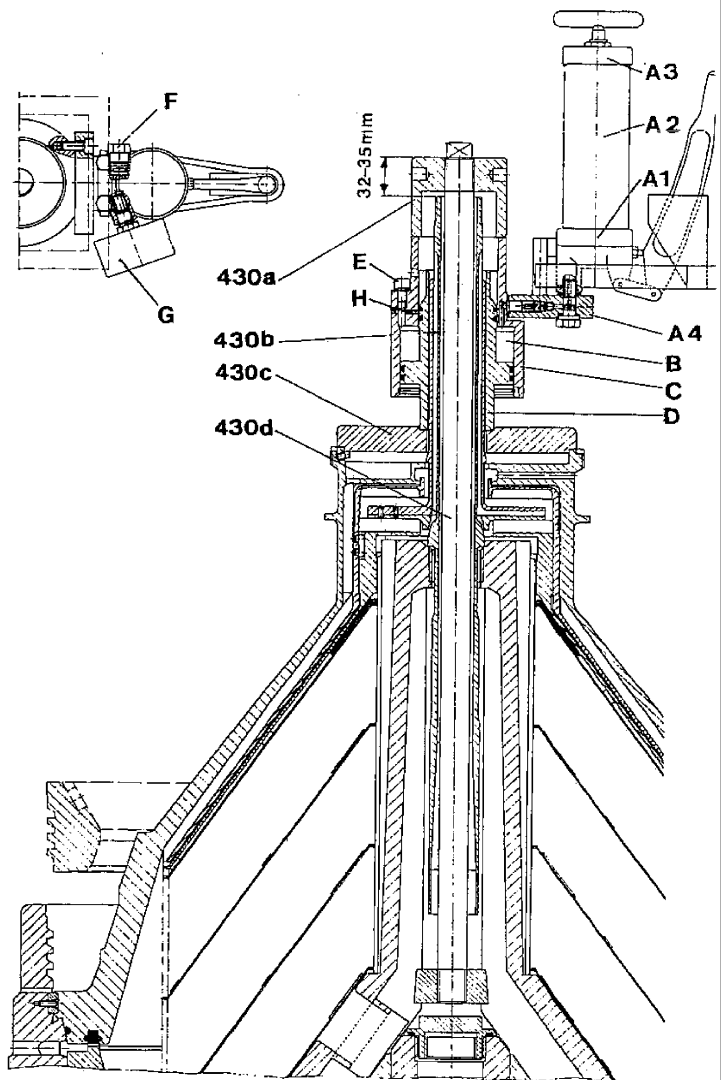


Fig. 4/10

430	Compressing device, compl.
430a	Threaded ring
430b	Hydraulic unit
430c	Disc
430d	Bolt

A	Oil pump
A1	Pump head
A2	Oil container
A3	Cover
A4	Check valve
B	Hydraulic chamber
C	Cylinder
D	Piston
E	Vent screw
F	Valve screw
G	Pressure gauge
H	Stroke limiting hole

5. Technical Information

=====

5.1. Functioning of the hydraulic system of the bowl

The self-cleaning bowl is equipped for ejecting the sediment during operation. Dirt particles accumulate in the conical space 11 of the bowl from where they are automatically discharged through ejection ports in the bowl bottom at pre-determined intervals.

The sliding piston 4 is hydraulically actuated to open and close the bowl ports. The water pressure created in the filled sealing chamber 3 keeps the bowl closed. When water drains out of the sealing chamber after opening of the opening-water valve, the product pressure above the piston pushes the piston down and opens the bowl ports.

Sealing of the bowl:

When the bowl has reached the speed necessary for developing the hydraulic pressure (after about 10 minutes), the main switch of the timing unit is to be closed, whereupon the sealing-water valve opens for 60 seconds. The sealing water flows into sealing chamber 3 underneath the sliding piston. The water pressure in the sealing chamber pushes the sliding piston upwards and presses it against gasket 9, thus sealing the bowl.

The sealing chamber is sealed off by valve piston 7 which is pressed through centrifugal force against gasket 8 and thus seals water discharge channel 10.

To make up for sealing-water losses, sealing water is supplied every 60 seconds for a period of 1 second, controlled by an electronic impulse relay.

Opening of the bowl (sediment ejection):

When opening-water valve is opened for sediment ejection, water flows through channel 5 to valve 6. The water pressure pushes valve piston 7 inwards thus opening channel 10. The water contained in sealing chamber 3 can then flow off (fig. 5/lc). As the liquid level recedes, the sealing pressure acting on the underside of the piston quickly decreases. As soon as it is smaller than the opening pressure acting on the upper side of the piston, the latter is pushed downwards, thus opening the ports in the bowl bottom for solids ejection.

Re-sealing of the bowl:

After sediment ejection the opening-water valve closes and the sealing-water valve opens. Valve piston 7 re-seals discharge channel 10 and sealing chamber 3 fills up with water. The liquid pressure in the sealing chamber exceeds the product pressure in the centrifugation room. The sliding piston is pushed upwards, thus re-sealing the centrifugation room.

The sediment ejections are initiated by the automatic timing unit (see sect. 5.2).

Sectional Diagram illustrating Sealing of the Bowl and Removal of the Solid Matter

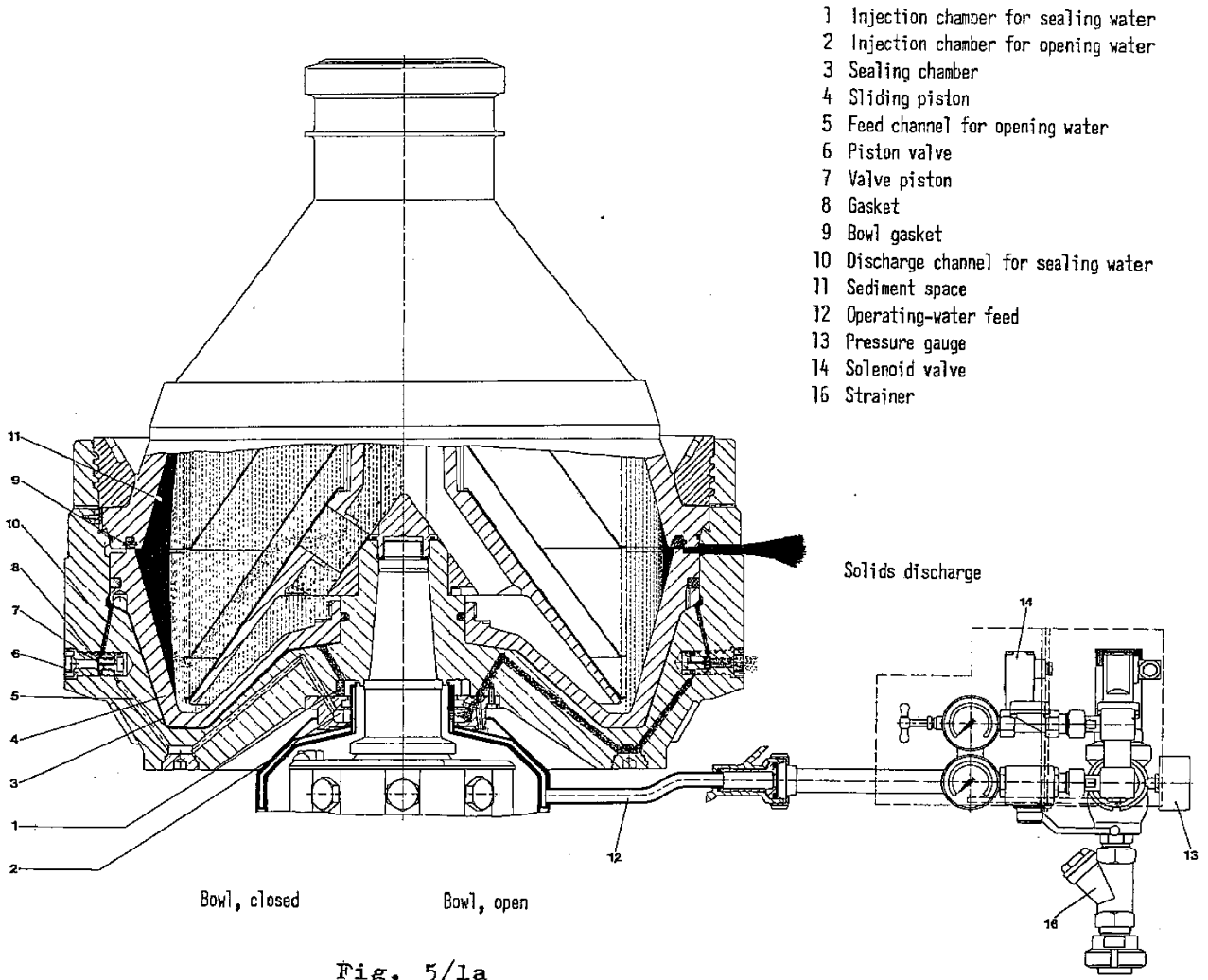


Fig. 5/1a

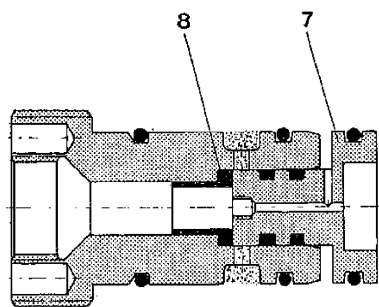


Fig. 5/1b

Functional diagram showing valve during separation.

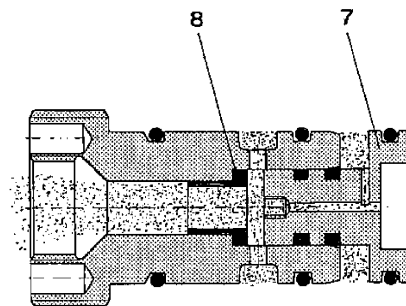


Fig. 5/1c

Functional diagram showing valve during solids ejection.

5.2. Timing unit

Partial sediment ejections during milk processing are programmed by the timing unit TVA 2-M. By pressing the button "Partial de-sludging", the program in action can be interrupted and a partial ejection process can be initiated immediately.

Total ejections during cleaning-in-place are initiated manually, by pressing the button "Total de-sludging" on the timing unit.

For details, refer to the instruction manual "WESTFALIA Timing Unit".

5.3. Operating-water connection

The inner diameter of the supply line to be connected to the operating-water system shall be 1", and the pressure in this line shall be at least 1.5 bars.

Important: Pressure fluctuations must not exceed 0.5 bar.

The operating-water connection is provided with a water-pressure reducer K (fig. 5/3) by means of which the line pressure is to be throttled to 1 bar. To adjust the water-pressure reducer, proceed as follows:

- 1) Open rapid-closing valve D (fig. 5/3) all the way.
- 2) Adjust pressure with adjusting screw J so that pressure gauge on pressure reducer indicates 1 bar.
- 3) Close rapid-closing valve D again.

The operating water must be clean so that at temperatures up to 80°C no precipitations will occur. It may be cold or lukewarm.

The strainer in filter G has to be cleaned from time to time.

Pressure gauges M and N (fig. 5/3) merely serve for checking the closing and opening operations.

5.3.1. Arrangement of the solenoid valves

In addition to the automatic solenoid valves, the operating-water connection comprises two rapid-closing valves D and F connected in parallel with solenoid valves A and B, as well as two shut-off valves a and b.

This arrangement allows changing over to manual operation in the event of failure of solenoid valves A or B for opening or closing of the bowl or in the event of failure of the timing unit.

When changing over to manual operation, rapid-closing valve D is to be opened to the extent that sealing water flows out of the operating-water discharge (see no. 18 in dimensioned drawing on page 0/7) at a rate of approx. 50 l/h in order to assure continuance of the separating process.

If the solenoid valves are defective, close manually-operated valves a and b.

Partial sediment ejection, initiated manually

- 1) Open rapid-closing valve D all the way.
- 2) Open rapid-closing valve F in order to open the bowl. As soon as de-sludging noises can be heard, close rapid-closing valve F in order to close the bowl.
- 3) Throttle rapid-closing valve D so that sealing water flows out of the operating-water discharge at a rate of approx. 50 litres/h.

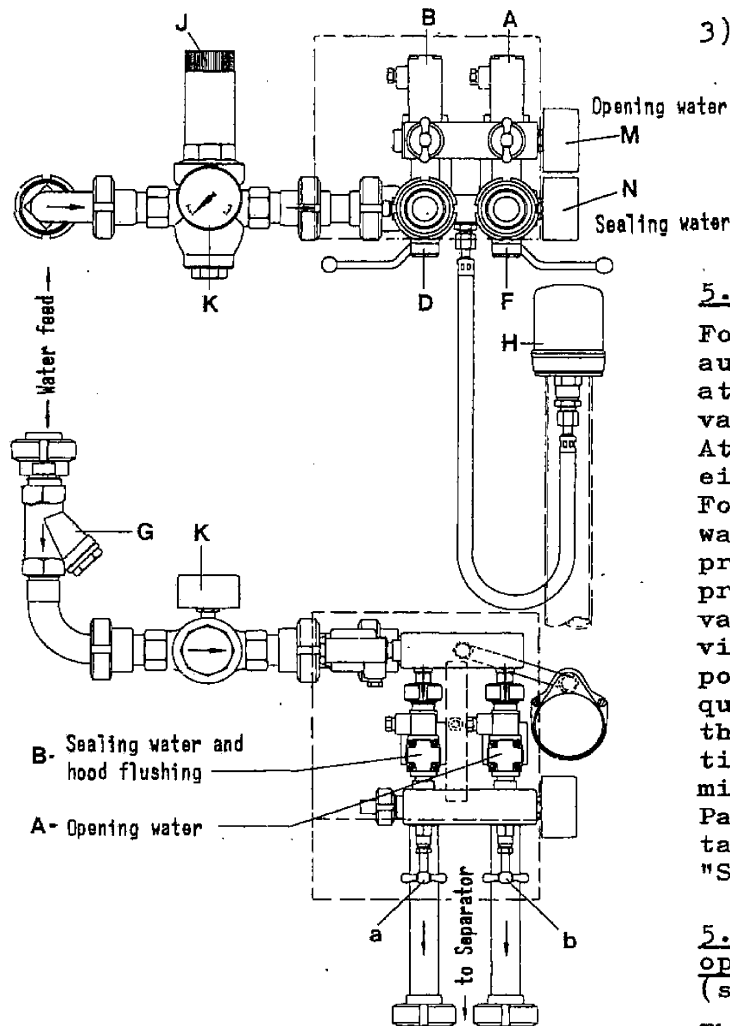


Fig. 5/3

Operating principle

In the normal, i.e. closed condition of the valve (de-energized), the water flowing into the valve from the feed side is unable to escape. It flows through a bore into the chamber above the diaphragm where a pressure equal to the water line pressure builds up. However, since the area exposed to water pressure on the upper side of the diaphragm is larger than the area exposed to the same pressure on the underside, the diaphragm is kept pressed against the valve seating.

Total ejection, initiated manually

- 1) Stop milk feed pump.
- 2) First open rapid-closing valve D, then open valve F.
- 3) When the de-sludging noises have stopped, close rapid-closing valve F and after about 5 seconds throttle rapid-closing valve D so that water will emerge from the operating-water discharge at the rate of 50 liters/h.

5.3.2. Pressure switch

For proper functioning of the automatic control a pressure of at least 0.6 bar is required while valve D is open. At a lower pressure the bowl will either not open or not close. For this reason the operating-water line is provided with pressure switch H which signals pressure drop below the minimum value by giving an audible or visible alarm. If it is not possible to re-establish the required water pressure immediately the switch "Separation" on the timing unit is to be opened and milk supply is to be stopped. Partial de-sludgings will no longer take place, and pilot lamp "Separation" will go out.

5.3.3. Solenoid valves for operating water and flush water (see fig. 17/2)

The solenoid valves incorporated in the operating-water feed line assembly are 2/2-way straight-flow valves with 2-way piloting. The solenoid head is completely moulded in epoxy resin ensuring perfect protection against entry of moisture, good dissipation of heat and perfect electrical insulation. So equipped, these valves are fully tropicalized.

Upon energizing of the magnet head, the core is pulled upwards so that the integrally vulcanized sealing element of the pilot valve is lifted from the valve seating, thus enabling the water to escape towards the discharge side of the valve. Since the diameter of the outlet opening of the chamber above the diaphragm is larger than the diameter of the inlet opening, the water flows out more quickly than it flows in and, consequently, the pressure acting upon the upper surface of the diaphragm decreases. As soon as it has become smaller than the pressure acting on the underside of the diaphragm (required pressure difference at least 0,5 bar), the diaphragm is lifted off its seat, thus opening the valve.

When current supply is cut off, the spring pushes down the magnet core, thus closing the pilot valve; liquid pressure builds up again above the diaphragm, and the solenoid valve closes.

Maintenance

The solenoid valves are maintenance-free. However, care should be taken that the coupler sockets are always screwed tightly to the magnet heads to ensure perfect sealing action of the gaskets.

Electric troubles

If it has been found that the timing unit functions properly and that voltage is present at the valve terminals of the terminal strip while the associated time function element is operating, the trouble will have to be ascribed either to a defective solenoid coil or to open circuit between terminal strip and valve, or to poor connection.

If the solenoid coil has proved to be defective, remove the magnet head after having withdrawn the coupler socket (to do this, loosen holding screw) and after having loosened the Allen screws.

The solenoid coil is cast integral with the magnet head. Therefore, if the coil needs replacement, the complete assembly (magnet head, part-no. 0018-3710-800, see page 17/3) will have to be exchanged.

Technical data

Solenoid valve	Type:	40 A / 121
Part - no.		0018-3711-600
Pipe connection	R	3/8"
Voltage	V	220 AC
Frequency	Hz	50/60
Optional voltages	V	24 AC, 115 AC, 24 DC
Power consumption: (AC operation) (DC operation)	pull-in VA	approx. 20
	operation VA	approx. 16
	W	approx. 12
Duty cycle	%	100
Frequency of operations	/h	1000
Type of enclosure	IP	65
Pressure range	bar	0.5 - 10
Temperature:	medium °C	+90
	ambient °C	+35
Cable entry	Pg	9

6. Operation

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6.1. Starting the separator

- 1) Check that
 - a) brakes are released (to do this turn handles clockwise),
 - b) oil level is slightly above middle of sight glass,
 - c) hex head screws for fastening the hood and cap nuts for fastening the discharge as well as the connection piece on the feed tube are tightened securely,
 - d) cream valve is open,
 - e) main valve in operating-water line is open.
- 2) Switch on the motor.
- 3) After a starting time of ten minutes turn on the main switch of the timing unit: the bowl closes.
- 4) After another two minutes start the water circulation as it is usually practiced in dairies.
- 5) After switching over to milk processing proceed as follows:

Operate switch "Separation" on timing unit. After having opened the milk feed valve, throttle constant-pressure valve on skim milk side by adjusting the operating-pressure reducing valve incorporated in the timing unit. At the same time adjust cream valve to desired cream flow rate.

Throttle constant-pressure valve while maintaining the desired cream flow rate, until slight overflow occurs. To check the overflow open inspection cover of hood a little. The pressure indicated by the pressure gauge in the skim milk line at the moment of overflow, is to be considered as maximum pressure. Then adjust pressure reducing valve until a pressure of 0.3 - 0.5 bar lower than the maximum pressure is obtained.

Adjustment of the constant-pressure valve to the operating pressure is only necessary during initial starting of the separator.

For the maximum back pressure in the connected processing equipment, permissible for the centripetal pumps supplied, refer to page 18/1.

To fully utilize the discharge pressure of the cream pump, e.g. when the separator is used for milk clarification where cream and skim milk are re-combined after separation, adjust the constant-pressure valve to the highest possible discharge pressure.

When clarifying milk, it may happen that cream with too high a butterfat content emerges from the separator although the cream valve is open and maximum pressure is prevailing in the skim milk line. This indicates that the backpressure is too high for the cream pump. To overcome this difficulty, the backpressure of the equipment downstream the separator has to be reduced or a booster pump has to be installed.

It should be noted that cream with a very high butterfat content, i.e. extremely viscous cream will lead to incorrect flowmeter reading inasmuch as the measuring rod is lifted to a higher level, thus indicating a flow rate that is higher than the actual cream flow.

If there is constant overflow in spite of a low skim milk discharge pressure, check condition of gaskets in centripetal pump chamber cover and in skim milk discharge and check if overlapping edges of centripetal pump chamber cover and of skim milk discharge are damaged at the sealing points.

In some cases, especially when using heaters with a low back pressure, it may be suitable to install in the line after or ahead of the heater a throttling valve and set it to about 1.5 bar in order to ensure foamfree operation of the separator.

The separating temperature should range between 40 and 50°C. If the milk tends to precipitate too great an amount of albumin, a separating temperature of about 35°C may be more suitable.

Possible causes of inefficient separation:

- 1) Unfavourable pre-treatment of the milk (pumps, agitator, high temperature).
- 2) Variations in temperature, in bowl speed or in throughflow capacity,
- 3) Leakage at separating disc,
- 4) Leakage in discharge lines and at cream pump tube,
- 5) Re-mixing of cream and skim milk after separation, e.g. caused by leaking cocks in pipe lines connected for drink milk production. Note that during milk separation the drain valve in the connection line must be open.
- 6) Homogenized return milk added to the raw milk.

Skim milk samples should be taken at the screwed union of the skim milk discharge.

If the trouble cannot be found with the separator or with the equipment ahead of the separator, check condition of chemicals used to analyse the skim milk. To make a test, fill water instead of skim milk into butyrometers.

6.2. Sediment ejection (de-sludging)

6.2.1. Partial sediment ejection (partial de-sludging)

Partial sediment ejection during milk processing means partial emptying of the sediment space of the bowl. The milk supply to the separator is not interrupted during partial sediment ejection.

To accomplish partial ejection, opening-water is briefly fed to the bowl via solenoid valve A (fig. 5/3). The duration of opening-water supply (= duration of partial ejection: 0.5 to 2 seconds) varies with the amount of ejected sediment and must, therefore, be determined by tests which can be carried out with water. During each partial ejection an additional amount of approx. 0.2 l/sec. of flush water flows off through the sediment discharge. This amount is to be deducted from the measured total volume.

When separating milk, adjust the duration of partial ejection so that approx. 5 litres will be ejected from the bowl.

When separating whey, adjust the duration of partial ejection so that approx. 10 litres will be ejected from the bowl.

Partial ejections are accomplished automatically at pre-determined intervals, controlled by the timing unit (5.2) or by another special device.

When the time adjusted at time function element "Separation" has elapsed (1 hour when separating milk and 15 to 30 minutes when separating whey), the first partial ejection takes place. Time function element "Pre-flushing" is to be set so as to ensure opening of solenoid valve B "Sealing and flush water" (fig. 5/3) 10 seconds before each partial ejection. The water injected into the hood will prevent incrustation of the sediment.

Time function element "Partial de-sludging" has to be adjusted so as to cause solenoid valve A "Opening water" to open briefly. Injection of opening water will cause the bowl to open and to eject 5 to 10 litres of sediment. Sealing and flush water valve B remains open during solids ejection and closes 60 seconds after the ejection process. The period of time during which this valve is to remain open after sediment ejection (at least 60 seconds) is adjustable by means of time function element "Subsequent flushing".

By operating push button "Partial sediment ejection", the separating process is interrupted and a partial sediment ejection is immediately initiated. When this enforced partial sediment ejection is finished, the program automatically re-starts the separating process.

The liquid obtained from a partial ejection process (approx. 5 litres of sediment and 15 litres of flush water) is collected in the sterilizing tank. The tank is capable of holding the liquid obtained from five partial ejections.

In the sterilizing tank, 1 kg of alkaline detergent has to be added. The mixture is heated up with steam to 95°C and kept at this temperature for 10 minutes. It can then be sent to the sewer.

6.2.2. Total ejection (total de-sludging)

For cleaning-in-place after milk processing a special timing unit is required. If this is not available, total ejections can be initiated by manual control of the timing unit TVA 2-M.

The switch "Separation" on the timing unit is to be kept in closed position. To initiate the total ejection, push button "Total de-sludging" has to be actuated.

Provided that the electrical installation has been carried out properly (see installation plan of timing unit), the feed pump(s) is (are) automatically switched off by pressing push button "Total de-sludging" and re-started automatically approx. one minute after total ejection. Interruption of the liquid supply to the bowl by stopping the feed pump is necessary for the recovery of the bowl speed which drops during total ejection.

After re-filling of the bowl (check increase of discharge pressure on separator), another total ejection can be initiated by pressing again push button "Total de-sludging".

Should the feed pump(s) fail to stop automatically during total ejection, switch off pump(s) manually and re-start it (them) one minute after total ejection.

6.2.3. Manually controlled sediment ejections

In case of emergency (e.g. failure of the timing unit or of the solenoid valves), the bowl can also be emptied by opening and closing the by-pass valves associated to the solenoid valves (see 5.3.1). During sediment ejection, the bowl speed will drop slightly. Bear in mind that sediment ejection is allowed to be repeated only when the bowl has re-attained its operating speed.

7. Cleaning

7.1. Cleaning-in-place

The separator is generally included in the C-I-P cycle of the pasteurizers. For cleaning the separator, the detergents used for cleaning the pasteurizers will be adequate. However, be sure that the last cleaning agent to be circulated is acid.

After milk processing, the residual milk is displaced and the whole equipment thoroughly flushed with water. Flushing is followed by two "total ejections" accomplished by pressing the push button "total ejection" on timing unit TVA 2-M.

The plant must be flushed with water and subsequent flush de-sludgings have to be performed even if the plant cannot be C-I-P-cleaned for some reason after milk processing.

The C-I-P-programme should comprise the following programme steps:

- 1) Flushing with caustic solution,
- 2) Flushing with water,
- 3) Flushing with acid solution,
- 4) Flushing with water.

IMPORTANT: Each of the programme steps 1 - 4 should be finished up with a total ejection.

During each programme step the spring-controlled constant-pressure valve, incorporated in the skim milk line is to be throttled several times by actuating the snap closure (cover). This will cause flooding of the centripetal pump chamber of the separator, resulting in thorough flushing of hood and sediment collector. If the separator is not equipped with a constant-pressure valve, the valve in the skim milk line must be throttled several times by hand.

IMPORTANT: Bear in mind that bowl parts of stainless steel will be attacked by chlorine. Therefore, make sure that detergents are free from chlorine.

7.2. Manual cleaning

In spite of cleaning-in-place, the bowl should be dismantled for check-up and manual cleaning once a month (see 4.3). On this occasion, guide surfaces and threads should be cleaned and wiped dry and lightly greased with the special lubricating paste furnished with the machine. After removal of the sliding piston 4 (fig. 5/1a), the sealing chamber 3 should be cleaned with special care.

8. The Gear

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8.1. Removing the vertical gear parts

After dismantling the bowl, loosen oil drain screw and let oil drain into oil cup. Then remove upper sight glass.

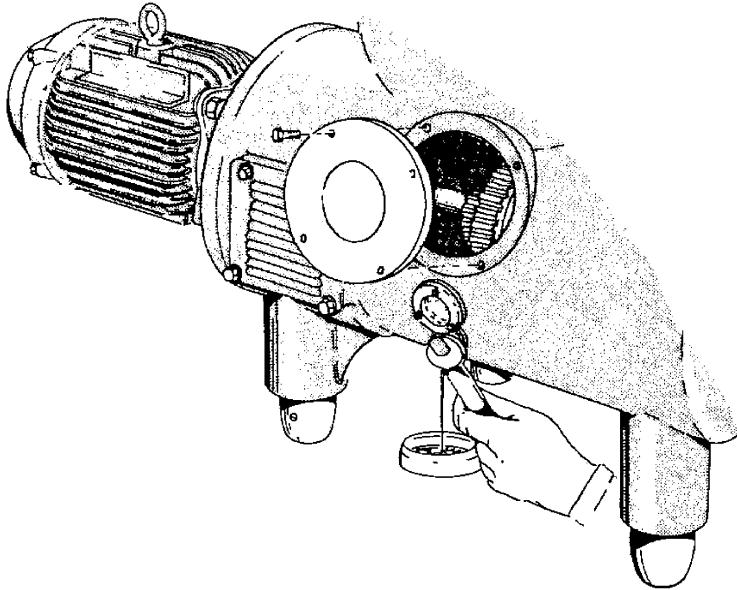


Fig. 8/1a

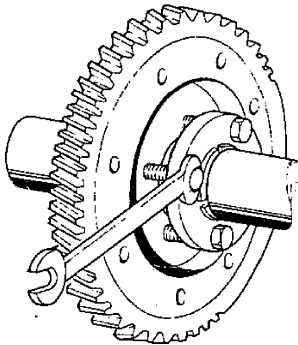


Fig. 8/1b

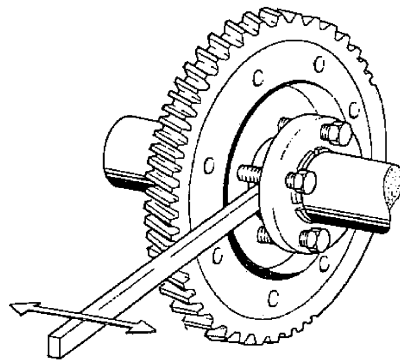


Fig. 8/1c

Loosen hex head screws in clamp plates of worm wheel (fig. 8/1b). Then slacken clamp plates until worm wheel can be moved on worm wheel shaft (fig. 8/1c). Push worm wheel to the left.

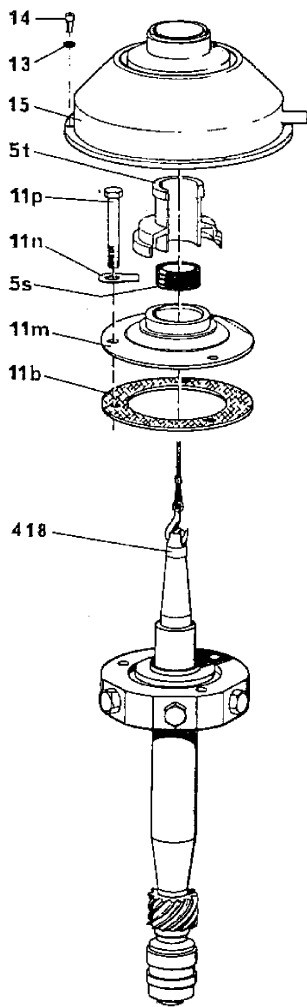


Fig. 8/2a

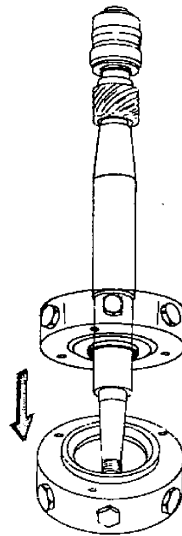


Fig. 8/2b

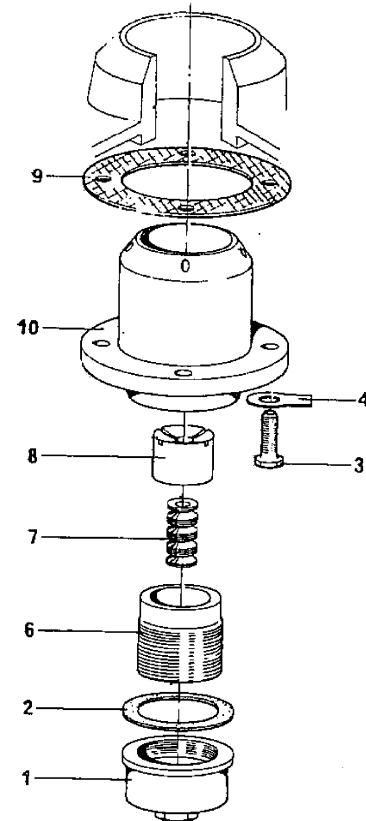


Fig. 8/2c

Fig. 8/2a:

Take off operating-water connection and remove bushes 37 and 39 (fig. 13/1).

Undo screws 14 and remove operating-water feed 15 and spindle cap 5t. Straighten tab washers 11n and unscrew hex head screws 11p. Take off protection cap 11m and spindle spring 5s.

Screw tool 418 onto worm spindle and lift out spindle together with neck bearing bridge.

Fig. 8/2b:

To remove neck bearing bridge, hold spindle in inverted position, upper end down, and tap lightly against a wooden surface. Neck bearing bridge will then slide off.

Fig. 8/2c:

Unscrew bottom bearing cap 1 and remove gasket 2. Unscrew bottom bearing threaded piece 6, and remove it together with spring column 7 and bottom bearing pressure piece 8.

Should the case arise that bottom bearing housing 10 has to be replaced, then proceed as follows: Straighten tab washers 4 and undo hex head screws 3. Take two of these screws and thread them into the tapholes of the bottom bearing housing. By doing so, the bottom bearing housing will be pressed out of the frame.

8.2. Re-assembly of vertical gear parts (fig. 14)

For re-assembly proceed in reverse order of removal (see 8.1) and according to instructions given in sect. 8.2.1 - 8.2.3.

8.2.1. Important hints for re-assembly

- 1) Before re-assembling the vertical gear parts, clean gear chamber thoroughly.
- 2) Check condition of ball bearings before re-fitting them onto worm spindle.
IMPORTANT: Use only high-speed precision ball bearings as per List of Parts.
For reasons of safety, replace ball bearings of worm spindle and worm wheel shaft every 5,000 running hours.
- 3) Before fitting ball bearings, ball bearing protection rings 5d and 5g, and ring 5n onto spindle, heat these parts in oil to approx. 80°C.

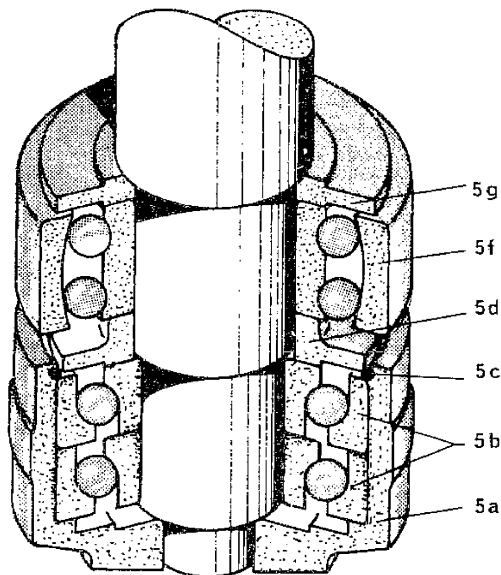


Fig. 8/3

- 4) If one of the angular contact ball bearings 5b needs replacement, be sure to replace both of them. Note that the angular contact ball bearings may be loaded axially in one direction only. They must be installed as shown in fig. 8/3. The narrow rim of the outer ring of each ball bearing must be on top. Faulty mounting will inevitably result in damage to bearings.
For assembly proceed as follows:
Slide the warmed-up angular contact ball bearings onto the spindle, slide snap ring 5c over ball bearings and let ball bearings cool down. Then fit bottom bearing pressure housing 5a over ball bearings and press snap ring 5c into groove of bottom bearing pressure housing.
- 5) It must be possible to install the worm spindle, with ball bearings attached, without having to hit on the upper spindle end, and to move the built-in spindle axially by hand. If this is not the case, remove burrs from the bottom bearing housing, using a very fine emery cloth.

- 6) When worm is worn and needs replacement, the worm wheel assembly with clamp plates 10 (fig. 15) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm.
- 7) When installing neck bearing bridge assembly 11c-h, make sure that gaskets 11b and 11k are in good condition. Be sure to insert distance ring 11a.
- 8) Before installing the neck bearing protection cap, check to be sure that there is a clearance of 3 - 3.5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. If not, proceed as per instructions of sect. 8.3.2.
- 9) **IMPORTANT:** After re-assembling the vertical gear parts, check bowl height for possible re-adjustment (see 8.3).

8.2.2. Assembling the neck bearing bridge

The upper ball bearing of the spindle is contained in pressure ring 11c which is held by nine radially arranged, evenly distributed springs 11g

- 1) Insert pressure ring 11c in neck bearing bridge 11d in such a manner that the nine recesses of the pressure ring face the nine tapholes of the neck bearing bridge.
- 2) Grease spring pistons 11h thoroughly. Fit neck bearing springs 11g into the nine spring pistons. Then put the spring pistons into threaded plugs 11f.
- 3) Screw the threaded plugs together with neck bearing springs and spring pistons into the tapholes of neck bearing bridge, and tighten.

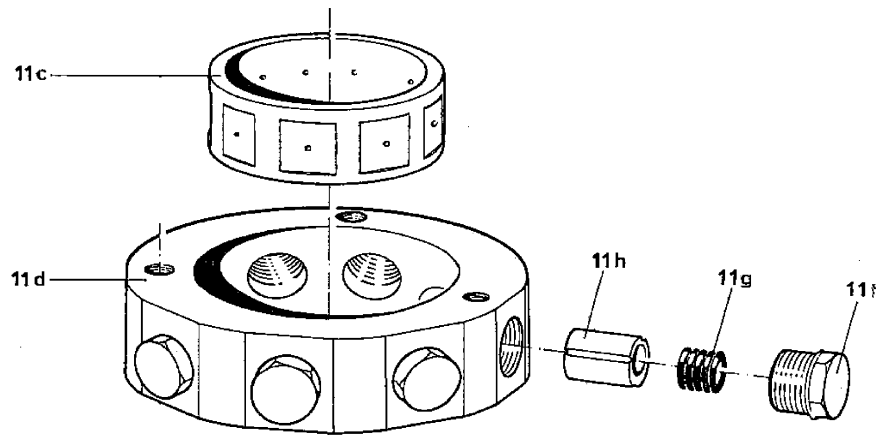


Fig. 8/4a

8.2.3. Installing spring column into bottom bearing

- 1) Slide cup springs 7 on bolt of bottom bearing threaded piece 6 as illustrated in fig. 8/4b.
- 2) Slip bottom bearing pressure piece 8 over spring column.

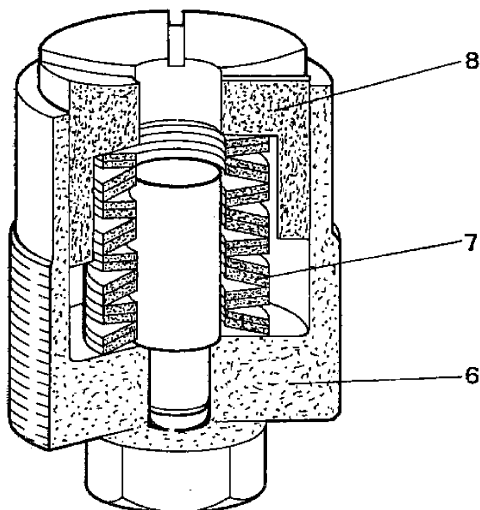


Fig. 8/4b

8.3. Bowl height

8.3.1. Checking the bowl height

NOTE: The bowl height has been adjusted at the factory before shipment of the separator. It must be checked for possible re-adjustment before the first start of the separator, after re-assembling the vertical gear parts, after exchanging the bowl or the centripetal pump, and as soon as the centripetal pump shows any grinding marks.

Prerequisite to correct bowl height adjustment is

- a) that the bowl is properly closed ("0" marks on bowl lock ring and bowl bottom must be aligned),
- b) that the hood is properly seated on the sediment collector and hex head screws 41b (fig. 13/1) are tightened securely,
- c) that the connection piece (fig. 8/5) is tightened firmly.

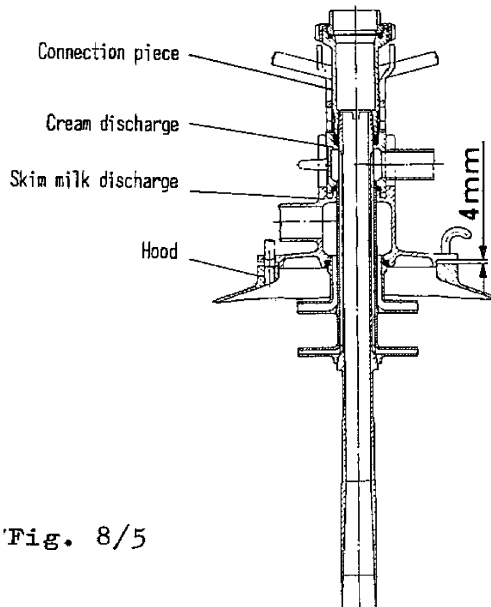


Fig. 8/5

The bowl height is correct when after loosening of the cap nuts, skim milk discharge together with cream discharge and connection piece can be raised so that there is a clearance of 4 mm between upper rim of hood and contact surface of skim milk discharge (fig. 8/5). If the clearance does not conform to this measurement, the bowl height has to be re-adjusted (see 8.3.2).

8.3.2. Re-adjusting the bowl height

For re-adjustment of the bowl height proceed as follows:

Unscrew bottom bearing cap 1 (fig. 14). Adjust bowl height (refer to fig. 8/5) by turning bottom bearing threaded piece 6. A full turn of the bottom bearing threaded piece to your Right or to your Left raises or lowers the bowl by 2 mm.

If the distance shown in fig. 8/5 is greater than 4 mm, the bowl is too high. Lower the bowl by turning the bottom bearing threaded piece in counter-clockwise direction.

If the distance shown in fig. 8/5 is less than 4 mm, the bowl is too low. Raise the bowl by turning the bottom bearing threaded piece in clockwise direction.

If the bowl has to be raised by more than 1 mm, it has to be removed (see 4.3). Remove operating-water connection and take out bushes 37 and 39 (fig. 13/1). Undo screws 14 and remove operating-water feed 15. Take off spindle cap 5t (fig. 14). Undo screws 11p and remove neck bearing protection cap 11m. Then turn bottom bearing threaded piece in clockwise direction until proper height is adjusted.

Each time the bowl has been lowered or raised, check if there is a clearance of 3 to 3.5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. In order to be able to check this clearance, remove bowl, operating-water connection, bushes 37 and 39 (fig. 13/1), operating-water feed, spindle cap and neck bearing protection cap, unless these parts have already been removed before raising the bowl by more than 1 mm. This check is not required if it has been made after re-assembling the vertical gear parts (see 8.2.1 No. 8) and the bowl had not to be raised by more than 1 mm.

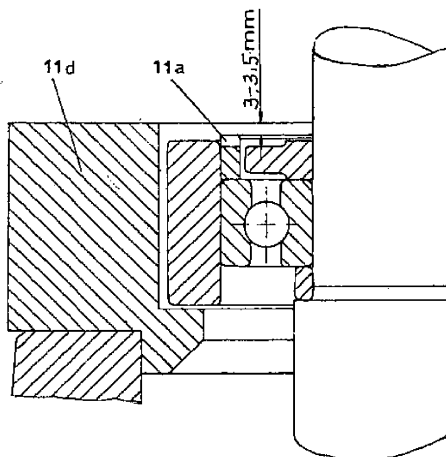


Fig. 8/6

If the clearance between the cams of the distance ring and the neck bearing bridge is smaller than 3 mm, the cams have to be filed to proper dimension. If the distance is greater than 3.5 mm, increase height of cams by welding or check with the factory for a new distance ring with properly sized cams.

After checking the clearance between distance ring and neck bearing bridge, re-install the above-mentioned parts. When installing the operating-water feed, check to be sure that gasket 38 (fig. 13/1) is in good condition.

Replace bottom bearing cap including gasket 2 (fig. 14) and close tightly.

Bear in mind that after fastening the neck bearing protection cap, the distance ring and, hence, the ball bearing 5p (fig. 14) will be under pressure until the spring column 7 in the bottom bearing is compressed by the weight of the bowl.

8.4. Removal of the horizontal gear parts

8.4.1. Removing the motor

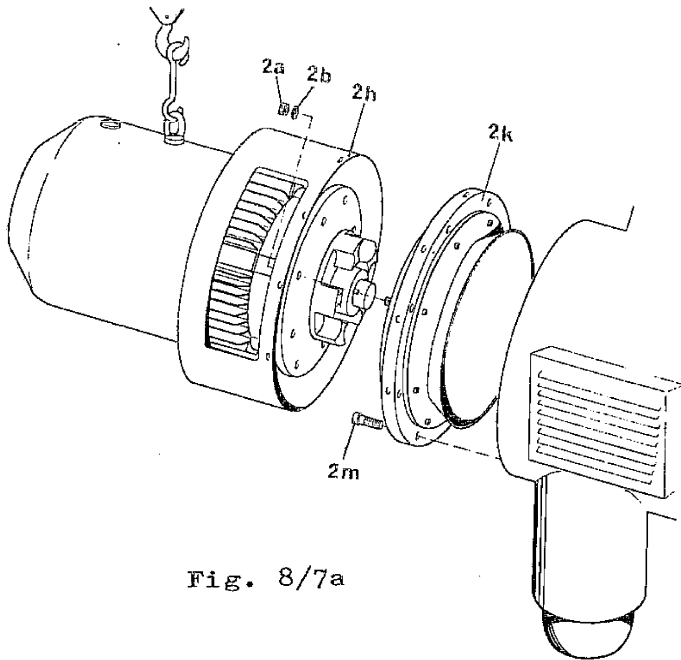


Fig. 8/7a

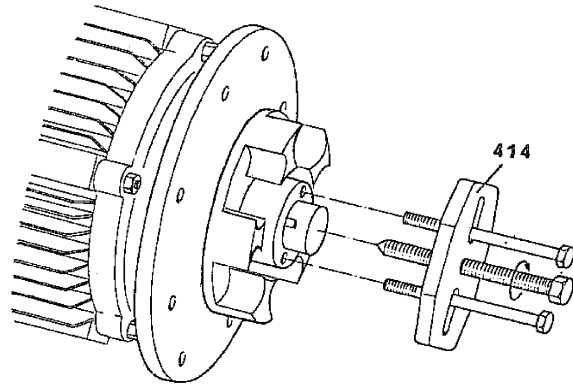


Fig. 8/7b

Remove lead-in wires from motor terminals. Unscrew hex head screws 2g and move cover 2h sideways. Sling motor to hoist and tighten carrying rope. Then unscrew hexagon nuts 2a through opening of cover which can be turned on the flange. Take off lock washers 2b.

Use hoist to lift off motor together with cam hub (see fig. 8/7a).

For removing cam hub from motor shaft end use puller 414 (fig. 8/7b).

8.4.2. Removal of the fluid clutch

After removing the motor, undo Allen screws 2m and take off flange 2k (see fig. 8/7a).

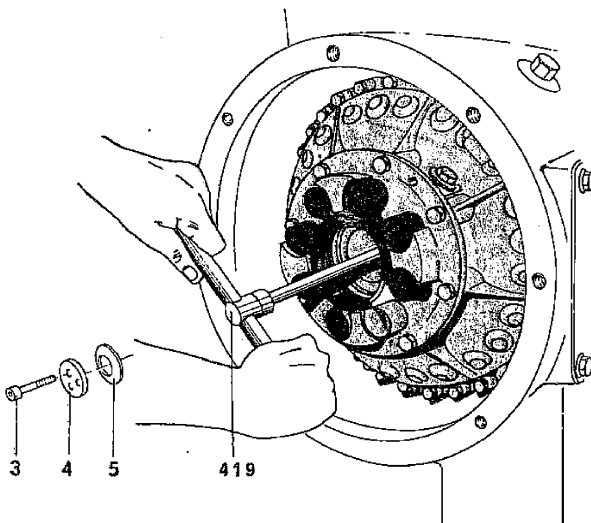


Fig. 8/7c

Loosen Allen screws 3 (fig. 8/7c) with torque-indicating wrench 416 (fig. 20) by consecutively giving each screw a quarter of a turn until tension of cup spring 5 slackens. Then screw out Allen screws all the way and remove washer 4 and cup spring 5.

It may happen that one of the three Allen screws can only be loosened by applying great force. In this case re-tighten the two remaining screws so that all three screws are equally tight. Then start loosening again as described above.

Be sure the socket of the wrench 416 is not worn!

To remove fluid clutch from cone of worm wheel shaft use pulling device 419.

8.4.3. Removing the worm wheel shaft

Remove fluid clutch (see sect. 8.4.2).

Loosen oil drain screw and let oil drain into oil cup. Remove upper sight glass (see fig. 8/1a).

Loosen hex head screws in clamp plates of worm wheel. Slacken clamp plates and push worm wheel to the left (fig. 8/1b, 8/1c).

Undo hex head screws 18 and remove cover 17.

Use wrench 416 to unscrew Allen screws 13. Remove disc 12.

By means of tool 419, pull brake pulley assembly 11a-d off the cone of worm wheel shaft.

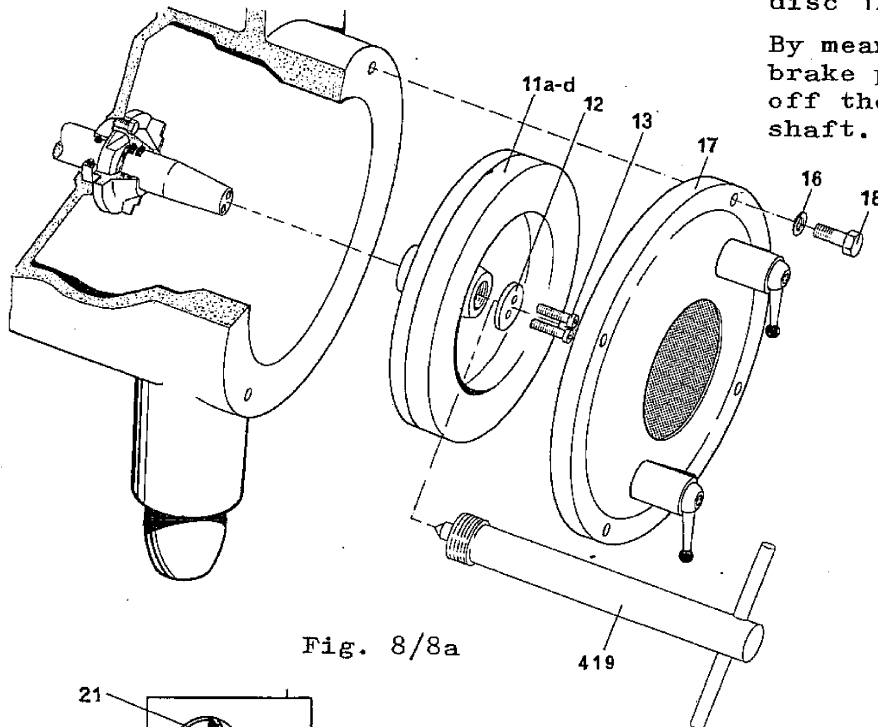


Fig. 8/8a

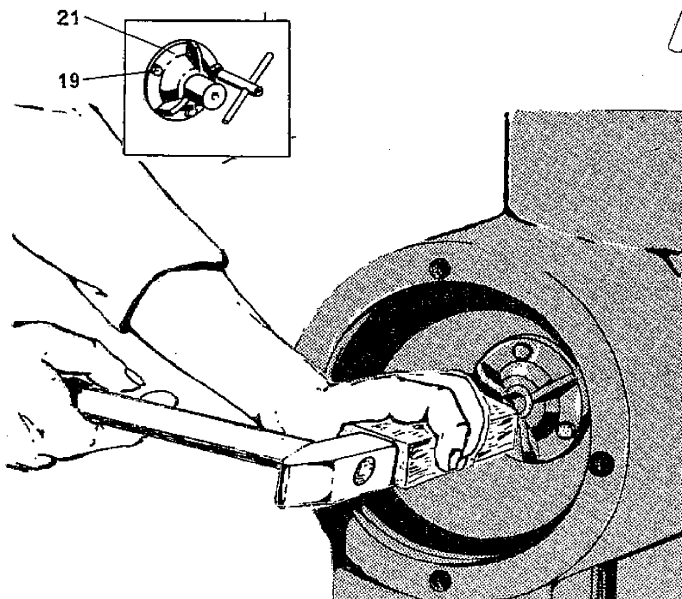


Fig. 8/8b

Remove hex head screws 19 from bearing cover 21 on the brake side (fig. 8/8b). Place a hard wood block against worm wheel shaft end, on motor side and rap gently with a hammer to drive the shaft, along with ball bearing, nut, and bearing cover, towards the brake side. When shaft has completed loosened from ball bearing on motor side, pull it out by hand. While doing so, hold worm wheel to prevent damage to gear teeth. Then take worm wheel assembly with clamp plates out of gear chamber.

8.5. Re-assembling the horizontal gear parts (fig. 15)

For re-assembly proceed in reverse order of removal (see sect. 8.4) and according to the following instructions:

- 1) The worm wheel with clamp plates (item 10 in fig. 15) has been balanced in the factory as complete assembly. To avoid unbalance, do NOT exchange component parts separately.
- 2) When mounting the worm wheel assembly with clamp plates, be sure to push it towards the brake side until it rests against the shoulder of the worm wheel shaft 25. This will ensure correct positioning of the toothed rim with reference to the worm.
- 3) The worm wheel must be firmly clamped to the worm wheel shaft, - accomplished by tightening screws 10c in the two clamp plates. Tighten the screws crosswise, by single turns, to make sure clamp plates are drawn together evenly.
- 4) **IMPORTANT:** When the toothed rim is worn, the entire worm wheel assembly with clamp plates has to be replaced. The worm 5k (fig.14) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm wheel.
- 5) Re-adjust proximity switch 40 with the aid of adjusting ring 439 (fig. 8/9).
- 6) Before installing the fluid clutch and the brake drum, apply a thin film of grease to the tapered ends of the worm wheel shaft. Then clean and wipe dry the tapered ends with a rag. Clean also inside of hubs of fluid clutch and brake drum very carefully, to assure proper fitting.
- 7) The fluid clutch and the brake drum must be firmly clamped to the worm wheel shaft. This is accomplished by tightening Allen screws with torque wrench 416 (fig. 20). Tighten the screws consecutively, by single turns. Give the final tightening at 4 - 4.1 mkp on the torque scale. When installing the fluid clutch, be sure to place cup spring 5 under washer. For correct arrangement refer to fig. 15.
- 8) When installing the motor, make sure that there is a clearance of 4 mm between cam hub 31 and fluid clutch (fig. 15 or 16). The distance has to be checked after exchanging the motor, the cam hub, the fluid clutch or the worm wheel shaft. If necessary, adjust the distance by displacing the cam hub on the motor shaft and drilling a new hole into the motor shaft for threaded pin 30.
- 9) Fill gear chamber with the oil specified in sect. 2. Oil level must be slightly above middle of sight glass.
- 10) To run in new gear parts (worm wheel and worm) let the separator run - without bowl - for about one hour. During this time, switch motor several times on and off.
- 11) For reasons of safety, replace ball bearings of worm wheel shaft and of worm spindle every 5,000 running hours.

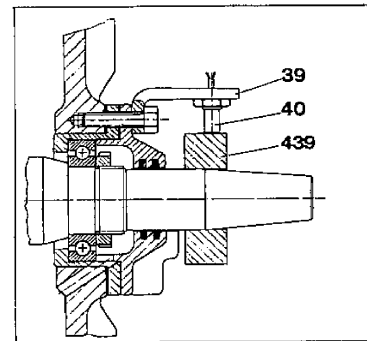


Fig. 8/9

9. The Fluid Clutch

9.1. General

The fluid clutch (Turbo Clutch) gradually brings the bowl to its rated speed, eliminating premature wear on gear parts and on motor. The motor power is transmitted by means of a closed oil circuit between a primary wheel driven by the motor shaft and a secondary wheel driving the worm wheel shaft of the separator.

The oil level in the fluid clutch must be up to the mark of the oil level indicator plate, to ensure that the bowl comes up to its rated speed within its starting time (see sect. 3.3).

When less oil is filled in, slippage in the clutch will be too great and starting time of the bowl too long. If the clutch contains too much oil, the starting time of the bowl will be too short, resulting in overload of motor and gear.

The oil in the clutch has to be changed every 5,000 working hours. It should be changed when the ball bearings of the worm spindle and of the worm wheel shaft are being replaced.

The clutch requires

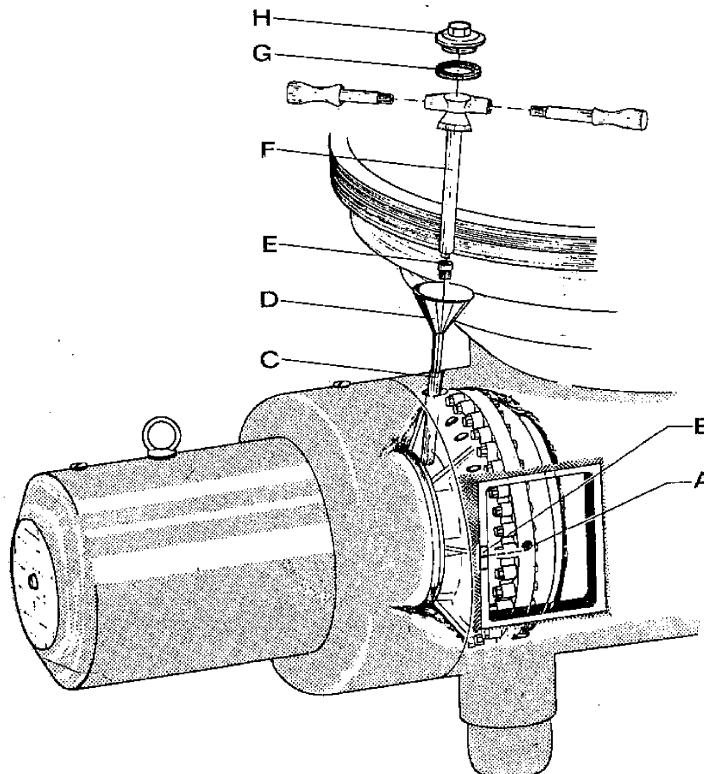
approx. 6,5 litres of oil when using a 1455 rpm motor,
approx. 5,35 litres of oil when using a 1745 rpm motor.

Be sure to use only the type of oil specified in sect. 9.4.

9.2. Checking the oil level

The oil level has to be checked before the initial start-up of the separator and every time after re-filling of oil. Furthermore, the oil level should be checked once a month since in the course of time small oil losses may occur.

Before checking the oil level, make sure oil has cooled down.



Checking the oil level:

Mark on oil level indicator plate B must be in line with lower edge of tap hole A. Oil level must be up to the lower edge of tap hole A.

Fig. 9/1

For checking the oil level, proceed as follows:

Remove the ventilation grid so that the oil level indicator plate can be seen. Bring the clutch into such a position that threaded plug A (fig. 9/1) can be removed without oil flowing out. Unscrew threaded plug with a wrench. Then turn clutch until lower edge of taphole is in line with mark on oil level indicator plate (fig. 9/1). In this position, the oil level in the clutch must be up to the lower edge of the taphole, so that the oil begins to overflow. If this is not the case, refill oil (see 9.3).

9.3. Re-filling of oil (fig. 9/1)

Remove threaded plug H. Loosen oil fill screw E with wrench F. Then take off the handles from the wrench and continue unscrewing the oil fill screw until it comes off. Now thread oil fill pipe C into the oil fill hole, introduce funnel D and pour in oil. Then check oil level (see 9.2) before replacing oil fill screw including gasket. Use wrench F to firmly tighten the oil fill screw.

9.4. Type of oil

For filling the clutch, use only steam turbine oil

Shell Turbo Oil T32

which has proved satisfactory in operation by meeting requirements as regards viscosity, flash point, lubricating properties, compatibility with metals and gaskets, aging, etc.

Two cans, each containing 5 litres of Turbo T32 oil, are furnished with the separator.

If this type of oil is not readily available, steam turbine oils which comply with the following specifications, may be used, however, temporarily only.

Designation: Lubricating oil TD-L 16 (according to DIN 51515)
(steam turbine oil with additives giving increased protection against corrosion and increased resistance to aging).

Kinemat. viscosity: 32 cSt / 40 °C

Density / 15 °C: max. 0.900 g/ml

Pour point: \leq -6 °C

Corrosive effect on copper:

max. degree of corrosion 2 (according to DIN 51759)

steel: no corrosion (according to DIN 51585)

Aging characteristics: Increase of the neutralization number after 1000 h: max. 2.0 mg KOH/g oil.

Contrary to DIN 51515:

Open flash point according to Cleveland: approx. 220 °C

9.5. Dismantling the fluid clutch (fig. 16)

The fluid clutch should not be dismantled in the site. If damage occurs, the clutch should be returned to the manufacturer for repair to assure correct fitting of the spare parts and, hence, proper functioning of the clutch. In the meantime, a spare clutch can be placed at your disposal.

If however, you decide to remove leakage of the clutch in the site, we recommend to check first sealing 17 because it is more easily accessible than sealing ring 4.

After taking the clutch out of the frame (see 8.4.2) remove screws 19 and lock washers and take off cover 18. Now check sealing ring 17 and replace it when its sealing lip is no more soft and elastic.

If, however, sealing ring 4 or the ball bearings have to be replaced, the clutch has to be dismantled in the following manner:

- 1) Loosen screw 24 and let oil drain.
- 2) Undo hexagon nuts 11 and remove them with lock washers 10. Then remove screws 7.
- 3) Press primary wheel off the clutch casing 8 by threading two of the screws 7 into the tapholes of primary wheel 12.
IMPORTANT: Bear in mind that the fluid clutch has been balanced in the factory. Therefore, be sure to mark both primary wheel 12 and clutch casing 8 before taking them apart, so that, when being re-assembled, these parts will be brought back into their original position.
- 4) Press ball bearing 15 out of primary wheel 12.
- 5) Undo screws 2 and remove cam flange 1.
- 6) Force secondary hub with secondary wheel 16 out of the clutch casing. Be sure not to damage running surfaces for the sealing rings. See also 9.6. no.6.
- 7) Screw screws 26 out of the clutch casing and remove oil control ring 25.
- 8) Press ball bearing 6 and sealing ring 4 out of the clutch casing.

9.6. Re-assembling the fluid clutch (fig. 16)

- 1) Moisten sealing rings. Press sealing ring 4 into the clutch casing by applying the tool shown in fig. 9/3 and then lightly hitting against bolt B. In order to be able to use the tool for pressing sealing ring 17 into cover 18, screw the bolt B into the other side of the disc. Then proceed in the same way as for sealing ring 4. The tool consisting of disc (part no. 3158-9939-000) and bolt (part no. 3170-9877-010) is supplied on special order only.

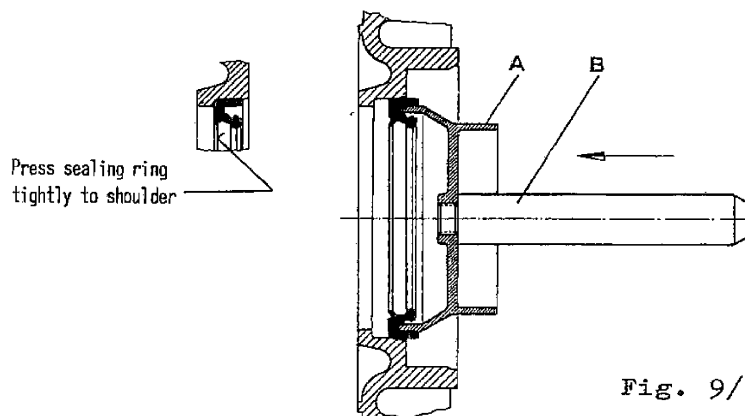


Fig. 9/3

Pressing the sealing ring into clutch casing.

- 2) Insert spacer ring 5 in clutch casing and spacer ring 13 in primary wheel (fig. 9/4a). The bevelled edge of each ring must snap into the groove of the bearing neck (fig. 9/4b). This will ensure that the spacer rings cannot move axially.

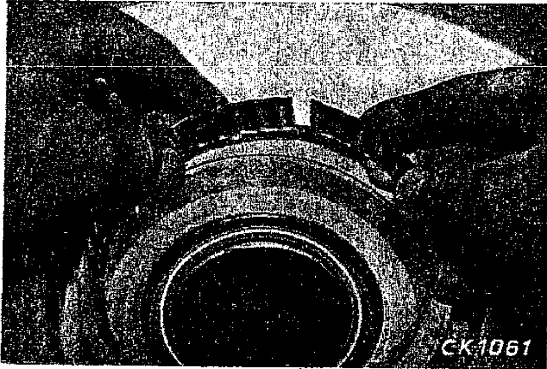


Fig. 9/4a

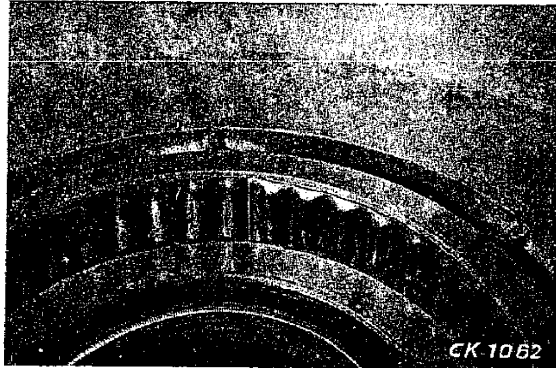


Fig. 9/4b

- 3) Press ball bearing 6 into clutch casing and ball bearing 15 into primary wheel. Check if the ball bearings pressed into the spacer rings have an absolutely tight fit. If this is not the case, the spacer rings have to be replaced. If necessary, return the clutch to the factory for repair.
- 4) Apply some oil-resistant sealing compound to oil control ring 25. Then fasten ring to clutch casing with screws 26. Be sure to fit lock washers.
- 5) Insert gasket 14 in groove of primary wheel. Then fasten cover 18 to primary wheel with screws 19. Be sure to fit spring washers.
- 6) Press secondary hub with secondary wheel, 16, into clutch casing. **IMPORTANT:** The surfaces contacting the sealing rings 4 and 17 must be perfectly smooth to ensure oil-tightness of the fluid clutch. If necessary, re-polish contact surfaces.
- 7) Fasten cam flange 1 to clutch casing with screws 2. Be sure to fit spring washers.

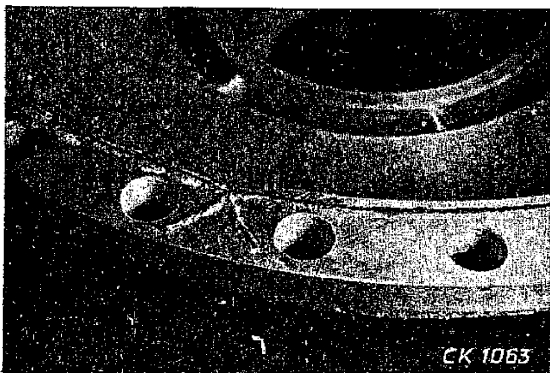


Fig. 9/4c

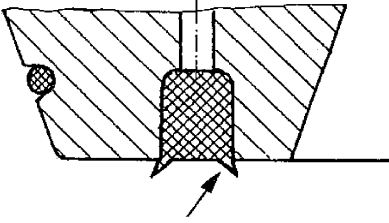
- 8) Place Teflon packing cord 9 on sealing surface of clutch casing as shown in fig. 9/4c. Make sure cord ends are crossed. To keep the cord in its place coat it with grease. Sealing surfaces of primary wheel and clutch casing must be in perfect condition; they must not be coated with a sealing compound.
- 9) Press primary wheel on secondary hub so that the marks on primary wheel and on clutch casing are in line (see sect. 9.5, no. 3). Then screw primary wheel and clutch casing together.

10. Trouble Shooting

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10.1. General

Troubles	Causes	Remedies
<p>10.1.1. The bowl does not come up to rated speed or takes too long to do so (see 3.3).</p>	1) Brakes are on.	Release brakes by turning handles in clockwise direction.
	2) Motor is incorrectly connected.	Check connection.
	3) Oil level in fluid clutch is too low or clutch is leaking.	Re-fill oil (see 9.3). Re-tighten nuts 11 of screws 7 (fig. 16) on clutch. If sealing rings 4 and 17 do not seal properly, ask for a re-conditioned clutch in exchange for your clutch.
	4) Bowl is placed too high or too low and rubs against centripetal pump.	Adjust to correct bowl height (see 8.3).
	5) Clamp plates are not tight enough. Worm wheel slips on shaft.	Tighten long hex head screws on worm wheel evenly and <u>firmly</u> . Tighten crosswise, by single turns.
	6) Feed line is open.	Close feed line.
<p>10.1.2. The bowl speed drops during operation.</p>	1) Oil level in fluid clutch is too low.	Re-fill oil (see 9.3).
	2) Motor speed drops during operation.	Check line voltage and inspect motor.
<p>10.1.3. The bowl comes up to rated speed too quickly (in less than 8 minutes). Motor pulls too high a starting current.</p>	The clutch contains too much oil.	Check oil level (see 9.2). Drain surplus oil.

Troubles	Causes	Remedies
<p>10.1.4. Uneven run of the separator.</p>	<p>1) Incomplete solids ejection. The remaining solids have deposited unevenly in the bowl.</p> 	<p>De-sludge the bowl several times (6.2.2). If this does not improve conditions, close the bowl and fill it with water to attenuate the increased vibrations occurring during slowing-down of the bowl.</p> <p>Stop the separator and apply brakes. If bowl is leaking, leave feed open. Clean bowl thoroughly. Remove protruding edges of bowl gaskets with a knife (see sketch).</p>
	<p>2) Bowl is incorrectly assembled or if the plant has several separators, parts of different bowls may have been interchanged.</p>	<p>Check and assemble bowl properly (see 4.1).</p>
	<p>3) Pressure in disc stack has slackened.</p>	<p>Check if bowl lock ring is screwed in tightly (see sect. 4.1, No. 17).</p> <p>Check disc count. If necessary, add spare disc.</p>
	<p>4) Bowl is damaged and, therefore, out of balance.</p>	<p>Send bowl to factory or authorized factory repair shop. Do NOT attempt to make your own repairs. Never weld or solder. Bowl is made of heat-treated steels.</p>
	<p>5) Neck bearing springs are weak or broken.</p>	<p>Replace all nine neck bearing springs.</p>
	<p>6) Ball bearings are worn.</p>	<p>Replace damaged bearings.</p> <p>IMPORTANT: As spindle bearings use only ball bearings with increased accuracy of running (see Parts List).</p>

Troubles	Causes	Remedies
<p>10.1.4. Uneven run of the separator (cont'd.).</p>	<p>7) Gear parts are in bad condition as a result of</p> <ol style="list-style-type: none"> 1. normal wear, 2. premature wear caused by <ol style="list-style-type: none"> a) lack of oil, <small>in general recognizable</small> b) oil of too low a viscosity, <small>by blue tempering colour of gear parts</small> c) metal abrasives present in the oil due to the following possible causes: <ul style="list-style-type: none"> - viscosity of oil is too low, - oil has not been changed in time, - gear chamber has not been cleaned, d) replacement of one gear part only, instead of both parts, e) infiltration of water because shut-off valves D and F (fig. 5/3) for sealing water were open for a longer period during shut-down of the separator. 	<p>Clean gear chamber thoroughly. Replace damaged gear parts: see 8.2, No.6 and 8.5, No. 4. Change the oil (see sect. 2). If necessary, change oil more often.</p> <p>Regarding <u>infiltration of water</u>, the following should be kept in mind: During shut-down of the separator, the shut-off valves D and F must always be kept closed.</p>
<p>10.1.5. Bowl lock ring is difficult to loosen.</p>	<p>Bowl has not been dismantled at regular intervals (see page 0/3, No.10).</p>	<p>Unscrewing of the bowl lock ring can be very much facilitated by blocking the bowl, which is accomplished by putting wedges between bowl bottom and sediment collector.</p>

10.2. Bowl performance

Troubles	Causes	Remedies
<p>10.2.1. The bowl does not close at all.</p> <p><u>IMPORTANT:</u> In this case switch off feed pump immediately.</p>	<p>1) The amount of sealing water fed to the bowl is insufficient because</p> <p>a) the water pressure in the supply line to the operating-water connection is too low (see 5.3.3),</p> <p>b) the water discharge holes in the top of the operating-water feed 15 (fig.13/1) are clogged with scale.</p>	<p>a) Check water pressure in the supply line which should be 1.5 bar. The pressure reducer shall be adjusted to 1 bar (for adjustment refer to sect. 5.3). After switching on the timing unit and after each de-sludging procedure the sealing-water valve is open for 60 seconds. During this time the amount of discharging sealing water should be measured at the operating-water discharge. The sealing water must discharge at a rate of 550 l/h. Opening of the sealing-water valve for measuring can be repeated by operating the main switch of the timing unit.</p> <p>b) Clean discharge holes.</p>
	2) Gasket 38 (fig. 13/1) is damaged or not inserted.	Replace or insert gasket.
	3) Strainer G (fig. 5/3) is dirty.	Clean strainer.
	4) Gaskets of piston valve 3 (fig. 19) are damaged.	Remove valve (see 4.5) and install new gaskets.
	5) Solenoid valve A (fig. 5/3) does not function properly, because the diaphragm has become brittle and, therefore, fails to seal properly.	Install a new diaphragm. Make sure that hole on outer rim of diaphragm lies over hole of valve housing.
	6) Rapid-closing valve F (fig. 5/3) is damaged. There is a continuous flow of opening water to the bowl.	Install a new rapid-closing valve.
	7) Gasket 5 (fig. 19) in sliding piston is damaged or its edges have been frayed through the up and down movement of the piston.	Replace damaged gasket. If, however, only the edges of the gasket are frayed and the gasket is not damaged otherwise, it can be re-used after grinding it off with an emery wheel.
	8) The operating-water feed is clogged.	Clean operating-water feed.

Troubles	Causes	Remedies
<p>10.2.2. The bowl does not close and open properly.</p>	<p>1) Gasket 5 (fig. 19) in sliding piston does not fit properly at all points of the guide surfaces, thus failing to seal properly.</p>	<p>If necessary, stretch gasket. Before installing the gasket, <u>lightly</u> grease groove in sliding piston (see 4.1, No. 6).</p>
	<p>2) Gasket 15 (fig. 19) in bowl top is damaged.</p>	<p>Replace gasket (see 4.4).</p>
	<p>3) Gasket 10 (fig. 19) has not been inserted into hub of bowl bottom.</p>	<p>Insert gasket.</p>
	<p>4) Gasket 5 (fig. 19) in sliding piston is uneven in height.</p>	<p>Replace gasket. The difference in height on a gasket must not exceed 0.25 mm.</p>
	<p>5) The sealing surface of the sliding piston 4 (fig. 19) is damaged.</p>	<p>Exchange the sliding piston.</p>
<p>10.2.3. The bowl does not open at all or not completely.</p>	<p>1) Dirt or rubber particles have settled between sliding piston and bowl bottom.</p>	<p>Clean bowl parts. Round off edges of gaskets. Replace damaged gaskets. Grease guide surfaces with the special lubricating paste supplied.</p>
	<p>2) Sealing chamber 3 (fig. 5/1a) is soiled.</p>	<p>Remove sliding piston 4 and clean sealing chamber.</p>
	<p>3) The boreholes in piston valve are clogged.</p>	<p>Remove the valve (see 4.5) and clean it.</p>



L I S T O F P A R T S
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IMPORTANT!

When ordering parts, please state the following:

- 1) Model
- 2) Serial-No.

of the Separator:

Both designations are shown on the name-plate of the separator. The Serial-No. also appears on the rim of the sludge collector.

- 3) Description
- 4) Part-No.

of the part to be replaced:

For details, see List of Parts. The Part-No. is also shown on all major parts.

- 5) Bowl Serial-No.

(only required when ordering bowl parts):

The Bowl Serial-No. appears, in large figures, on bowl lock ring and on bowl bottom.

Part-Nos. ending with letter "L" (e.g. 3158-1021-L) designate parts which are available in different designs for the separator concerned. To ensure correct delivery of these parts, Model and Serial-No. of the Separator MUST be stated.

Frame and Hood
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No. in Fig.	Part - No.	Qty.	Part Description
-	3170-1020-010	1	Foundation frame assembly (1a-c)
1a	3170-1003-010	1	Foundation frame
1b	0026-2031-300	4	Cap
1c	3157-1033-000	4	Bolt
-	2315-1015-010	4	Foot, complete (2a-c)
2a	2315-1011-000	4	Foot with lining
2b	0019-6387-400	4	Threaded pin M12x28 DIN 915
2c	0021-3018-750	4	Rubber cushion
3	0001-0516-300	4	Flange
4	0019-6937-400	12	Hex head screw M10x30 DIN 933
5	1166-1006-030	1	Lower section of frame, complete
5a	0018-3955-300	1	Cone connection D50 DIN 11851
5b	0013-2845-300	1	Grooved coupling nut F50 DIN 11851
5c	0007-2211-750	1	Gasket G50 DIN 11851
6	0007-2954-750	1	Gasket 590/4
7	0019-7036-400	8	Hex head screw M16x35 DIN 933
8	0004-2290-400	8	Gasket 16.7/24x1.5
9	0007-2113-750	1	Gasket 94/104x6
10	1167-1045-000	1	Pipe connection
11	0019-6968-300	3	Hex head screw M12x25 DIN 933
12	0007-2571-750	1	Gasket 297/4
13	0026-1325-300	8	Lock washer A8 DIN 127
14	0019-6122-400	8	Allen screw M8x20 DIN 912
15	1168-1219-000	1	Operating-water feed
16	1165-1018-020	1	Sediment collector
17	0007-2580-750	1	Gasket 42/2.5
18	1165-1183-000	1	Plug
19	0013-0404-400	2	Cap nut M8 DIN 1587
20	0007-2320-750	1	Gasket 45/55x5
21	0007-2800-840	1	Gasket 725.5/744x9.8
22	0019-0840-400	1	Oil drain screw
23	0004-5037-710	1	Gasket 38/50x1.5
24	0001-0022-400	1	Sight glass frame
25	0019-6845-400	3	Hex head screw M6x25 DIN 933
26	0001-0027-830	1	Sight glass
26a	0004-5406-750	1	Gasket 110x3
26b	0004-5056-740	1	Gasket 70/80x2
27	0026-1371-400	4	Washer 13 DIN 125
28	0019-6970-400	4	Hex head screw M12x30 DIN 933
29	3050-1085-010	1	Ventilation grid
30	0019-6966-400	4	Hex head screw M12x20 DIN 933
31	0026-1375-300	4	Washer
32a	0001-0925-870	1	Sight glass 322x5
32b	1166-1157-020	1	Ring
33	0007-2229-750	1	Gasket 40/48x5
34	0019-1748-400	1	Plug
35	0004-5762-700	2	Gasket 273/322x2
36	0007-2208-750	2	Gasket G25 DIN 11851
37	1167-1074-000	1	Sleeve
38	0007-2521-750	2	Gasket G15 DIN 11851
39	1168-1074-000	1	Sleeve
-	1170-7759-000	1	Hood assembly (41a-41n)
41a	0004-2364-758	1	Packing cord 8x8x3300
41b	0019-6970-400	8	Hex head screw M12x30 DIN 933
41c	1170-7765-000	1	Hood
41d	0007-2262-750	1	Gasket 45/57x6
41f	1165-1061-000	1	Inspection cover
41g	0013-0405-400	2	Cap nut M10 DIN 1587
41h	0013-0406-400	4	Cap nut M12 DIN 1587
-	0026-0165-400	4	Washer 13 DIN 433
41k	1165-2775-000	1	Siphon, complete
41m	0013-2842-300	1	Grooved coupling nut F25 DIN 11851
41n	0007-2208-750	1	Gasket G25 DIN 11851

Frame and Hood

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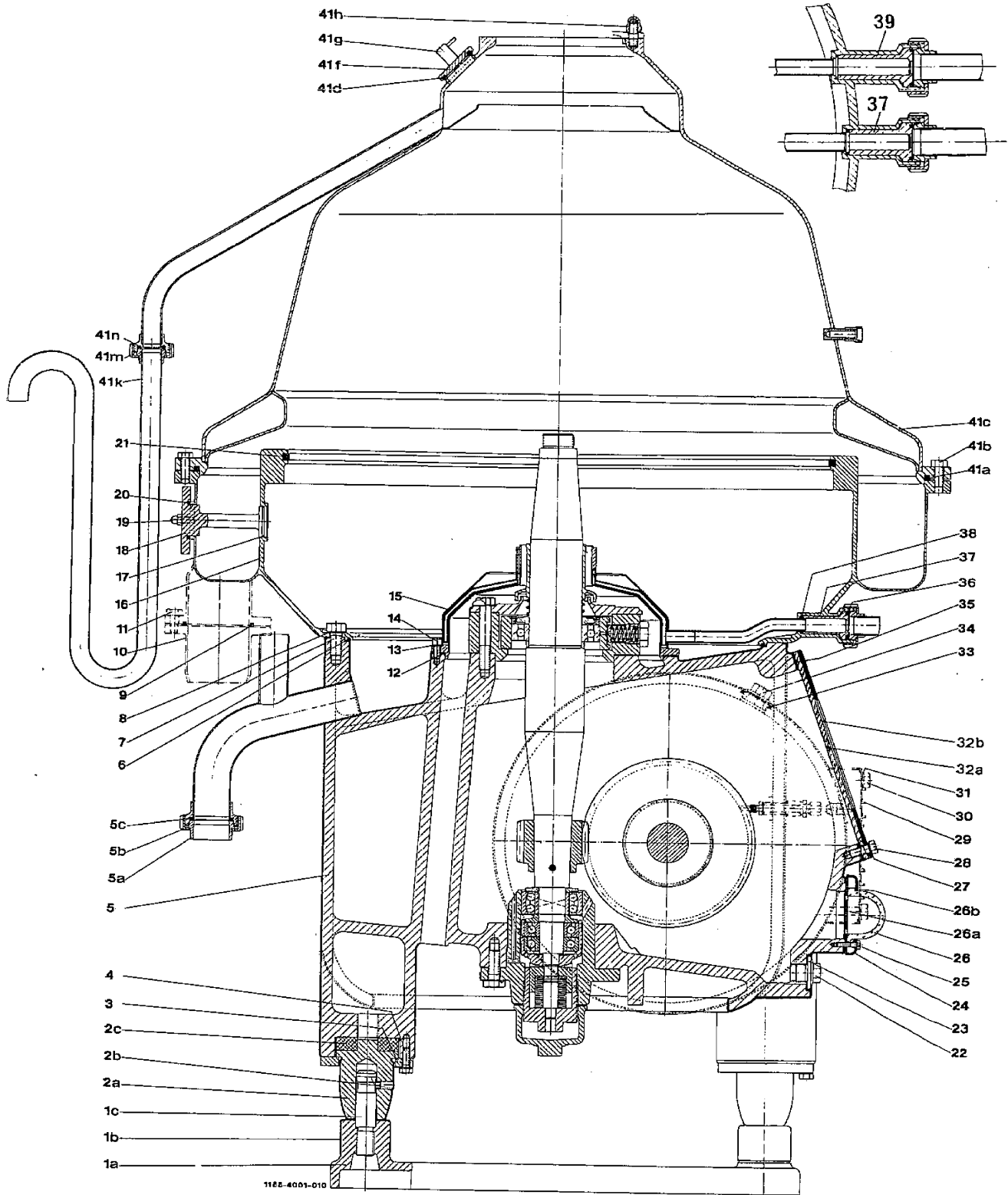


Fig. 13/1

Vertical Gear Parts

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(f = 50 Hz)

No. in Fig.	Part - No.	Qty.	Part Description	
1	0010-8003-210	1	Bottom bearing cap	
2	0004-2221-740	1	Gasket 80/108x2	
3	0019-7038-150	4	Hex head screw M 16x45 DIN 933 - 8.8	
4	0026-5894-600	4	Tab washer 17 DIN 93	
-	1167-3429-020	1	Worm spindle assembly (5a-t)	
5a	0010-8012-020	1	Bottom bearing pressure housing	
5b	0011-7307-100	2		Angular contact ball bearing 7307 BGM/P 6 DIN 628
5c	0026-2109-170	1		Snap ring
5d	0008-4008-030	1		Ball bearing protection ring
5f	0011-2308-120	1		Pendulum ball bearing 2308 M/P6 DIN 630
5g	0008-4008-020	1		Ball bearing protection ring
5h	0026-1563-120	1		Straight grooved pin 10x70 DIN 1473-6S
5k	3170-3423-010	1		* Worm
5m	3159-3410-000	1		Spindle
5n	0008-6512-050	1		Ring
5p	0011-6213-110	1		Grooved ball bearing 6213/P6 DIN 625
5r	0008-6508-050	1		Ball bearing protection ring
5s	0006-4383-160	1		Cylindrical pressure spring
5t	0008-6501-810	1		Spindle cap
6	0010-8002-040	1		Bottom bearing threaded piece
7	0006-4440-160	1	Spring column	
8	0010-8001-200	1	Bottom bearing pressure piece	
9	0004-5793-770	1	Gasket 130/204 ϕ x0.3	
10	3050-1112-020	1	Bottom bearing housing	
-	0008-6500-090	1	Neck bearing bridge assembly with covering (11a-p)	
11a	0008-6509-050	1	Distance ring	
11b	0004-5851-770	1		Gasket 176/235 ϕ x0.3
-	0008-6510-070	1		Neck bearing bridge assembly (11c-h)
11c	0008-6507-000	1		Pressure ring
11d	0008-6506-000	1		Neck bearing bridge
11f	0019-1423-030	9		Threaded plug
11g	0006-4380-090	1		Set of neck bearing springs
11h	0026-2220-110	9		Spring piston
11k	0004-5852-770	1		Gasket 156/235 ϕ x0.3
11m	0008-6502-120	1		Protection cap
11n	0026-5894-600	3		Tab washer 17 DIN 93
11p	0019-6616-150	3		Hex head screw M 16x100 DIN 931

* When this part needs replacement, the worm wheel assembly with clamp plates, 10a-g, fig. 15, should be replaced as well.

Vertical Gear Parts

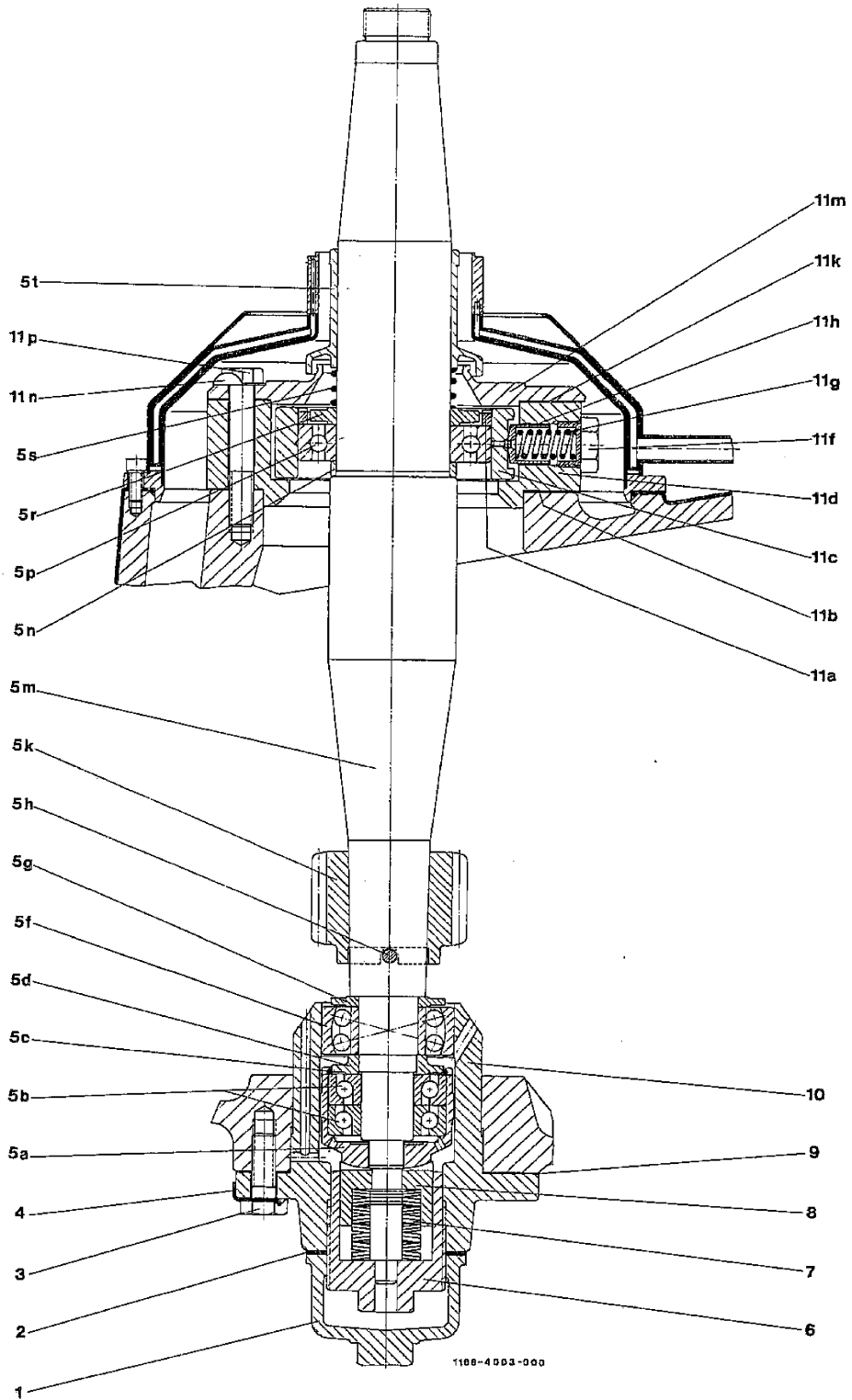
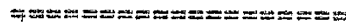


Fig. 14

Horizontal Gear Parts

(f = 50 Hz)

No. in Fig.	Part - No.	Qty.	Part Description
1	5970-L	1	* Motor
-	1165-1021-L	1	Flange assembly (2a-m)
2a	0013-0282-400	8	Hexagon nut M 16 DIN 934
2b	0026-1330-190	8	Lock washer A 16 DIN 127
2f	0019-7727-090	8	Stud M 16x45 DIN 939 - 5.6
2g	0019-6839-300	8	Hex head screw M 6x10 DIN 933
2h	1080-1475-050	1	Cover
2k	1165-1028-L	1	Flange
2m	0019-6202-150	8	Allen screw M 16x45 DIN 912 - 8.8
3	0019-6150-150	3	Allen screw M 10x55 DIN 912 - 8.8
4	0026-1640-030	1	Centering disc
5	0006-4404-010	1	Cup spring
6	3050-3375-010	1	Bearing cover
7	0019-6938-150	3	Hex head screw M 10x35 DIN 933 - 8.8
8	0004-1850-740	2	Gasket 99/140x1
9	1166-3131-000	2	Bearing housing
10	1167-3449-020	1	Worm wheel assembly with clamp plates
10a	1166-3447-000	1	** Clamp plate, toothed
10b	1166-3446-000	1	** Clamp plate
10c	0019-6525-150	4	** Hex head screw M 10x110 DIN 931 - 8.8
-	1166-3368-020	1	Brake pulley assembly (11a-d)
11a	0019-6144-150	6	Allen screw M 10x25 DIN 912 - 8.8
11b	0026-1337-190	6	Lock washer A10 DIN 127
11c	1166-3371-030	1	Brake pulley
11d	3170-3371-000	1	Brake ring
12	0026-0405-030	1	Disc
13	0019-6150-150	2	Allen screw M 10x55 DIN 912 - 8.8
14	0019-9063-150	2	Threaded pin AM 8x10 DIN 916 - 10.9
-	3170-1043-000	2	Brake assembly (15a-f)
15a	0021-3514-300	2	Brake handle
15b	3170-1031-000	2	Brake bolt (with lining)
15c	0021-3537-300	2	Brake housing
15d	0006-4208-160	2	Cylindrical pressure spring
15f	0021-4096-850	2	Brake lining
-	0026-1263-550	8	Countersunk rivet
16	0026-1353-400	4	Washer
17	3170-1065-010	1	Cover
18	0019-6608-400	4	Hex head screw M 16x60 DIN 931
19	0019-6512-150	3	Hex head screw M 10x40 DIN 931
20	0004-1956-830	2	Felt ring 45 DIN 5419
21	3170-3375-000	1	Bearing cover
22	0004-1822-740	1	Gasket 90/140x1
23	0013-0448-090	1	Grooved nut M50x1.5 SKF/KM10
24	0011-6210-000	1	Grooved ball bearing 6210 DIN 625
25	1166-3400-000	1	Worm wheel shaft
26	0011-6210-000	1	Grooved ball bearing 6210 DIN 625
27	0004-1822-740	1	Gasket 90/140x1
29	see page 16/1	1	Fluid clutch (see fig. 16)
30	0019-8984-150	1	Threaded pin M 10x25 DIN 914 - 10.9
31	3158-3389-L	1	Cam hub
32	3158-3282-000	1	Cam ring
38	0004-1957-830	2	Felt ring 50 DIN 5419
39	1168-1192-000	1	Bracket
40	0005-0964-000	1	Proximity switch

* When ordering a motor, be sure to state voltage and frequency.

** This part is included in worm wheel assembly with clamp plates, item 10, but it is also available as separate item. When the worm wheel needs replacement, the worm 5k, fig. 14, should be replaced as well (see section 0.5, No.4).

Horizontal Gear Parts

U.S. PATENT OFFICE

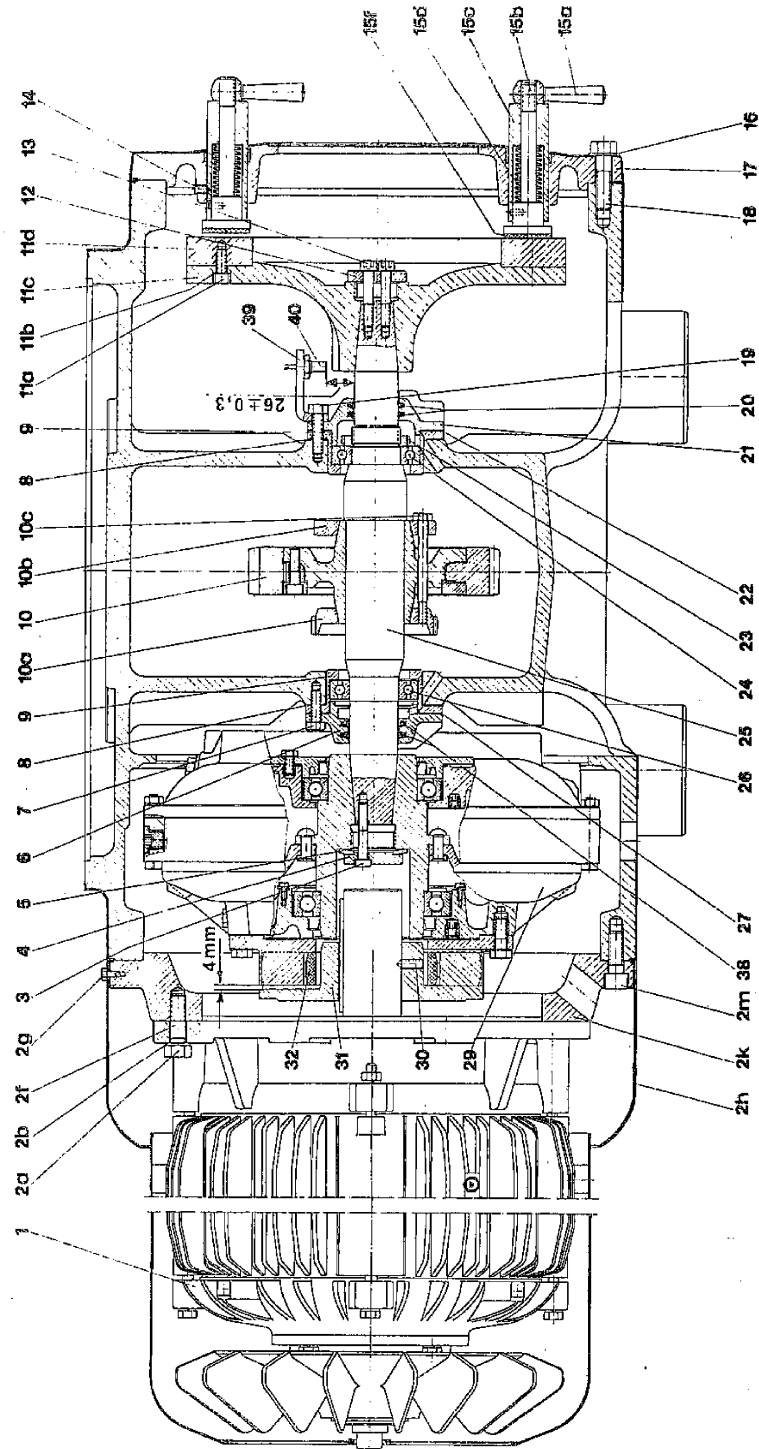


FIG. 15

Pneumatic Brake

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(on special order only)

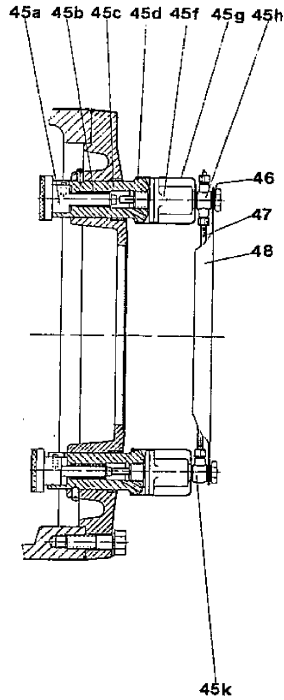


Fig. 15/1

No. in Fig.	Part - No.	Qty.	Part Description
45a	1166-1031-000	2	Brake bolt (with lining), complete
-	0021-4096-850	2	* Brake lining
-	0026-1263-550	8	* Countersunk rivet
45b	0006-4120-300	2	Cylindrical pressure spring
45c	0021-3555-300	2	Brake housing
45d	0007-2580-750	2	Gasket 42/2.5
45f	0021-3690-010	2	Compressed-air cylinder
45g	0026-2144-400	2	Cap
45h	0018-3740-640	1	T-type hose connection R 1/4"
45k	0018-3730-640	1	Angular hose connection R 1/4"
46	0004-2245-770	2	Gasket 15/21x0.25
47	0018-0585-848	1	Pipe
48	1166-1044-000	1	Protecting sheet

* This part is included in the preceding "complete" part, but it is also available as separate item.



Fluid Clutch

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No. in Fig.	Part - Number	Qty.	Part Description
-	1166-3280-000	1	Fluid clutch assembly (1-29) (see also fig. 15, no. 29)
1	-	1 *	Cam flange
2	-	8 **	Hex head screw M12x35 DIN 931- 8G
3	-	8 **	Washer B 12 DIN 137
4	0004-2913-830	1	Sealing ring 105x130x13
5	0026-0182-170	1	Spacer ring ANS 160x26
6	0011-6021-400	1	Grooved ball bearing 6021 M/C4 DIN 625
7	-	36 **	Hex head screw M10x70 DIN 931 - 8G
8	-	1 *	Clutch casing 470 ϕ
9	0004-2385-858	1	Packing cord 1 mm ϕ , 1400 mm long
10	0026-0771-170	36	Lock washer B 10 DIN 137
11	-	36 **	Hexagon nut M 10 DIN 934 - 6S
12	-	1 *	Primary wheel 470 ϕ
13	0026-0180-170	1	Spacer ring AN 140x24
14	0007-2944-830	1	Gasket 140/3 ϕ
15	0011-6018-400	1	Grooved ball bearing 6018 M/C4 DIN 625
16	-	1 *	Secondary hub with secondary wheel 425 ϕ
17	0004-2912-830	1	Sealing ring 90x110x13
18	-	1 **	Sealing ring cover
19	-	8 **	Hex head screw M8x20 DIN 933 - 8G
20	0026-0770-170	8	Lock washer B 8 DIN 137
21	0004-2144-280	2	Gasket 22/29 ϕ x 1.5
22	-	2 **	Threaded bolt M 22x1.5x20
23	0004-2131-280	1	Gasket 18/24 ϕ x 1.5
24	0019-1490-000	1	Threaded plug M 18x1.5x15
25	3158-3287-010	1	Oil control ring 119/192 ϕ x 4.5
26	-	8 **	Fillister head screw AM 5x15 DIN 84 - 4S
27	-	8 **	Lock washer 5 DIN 7980
29	0019-1551-090	1	Oil fill plug M 22x1.5

* If this part needs replacement, the complete clutch must be returned to the factory for repair. Instead of part-number state item-number (see first column).

** Instead of part-number state item-number (see first column).

Fluid Clutch

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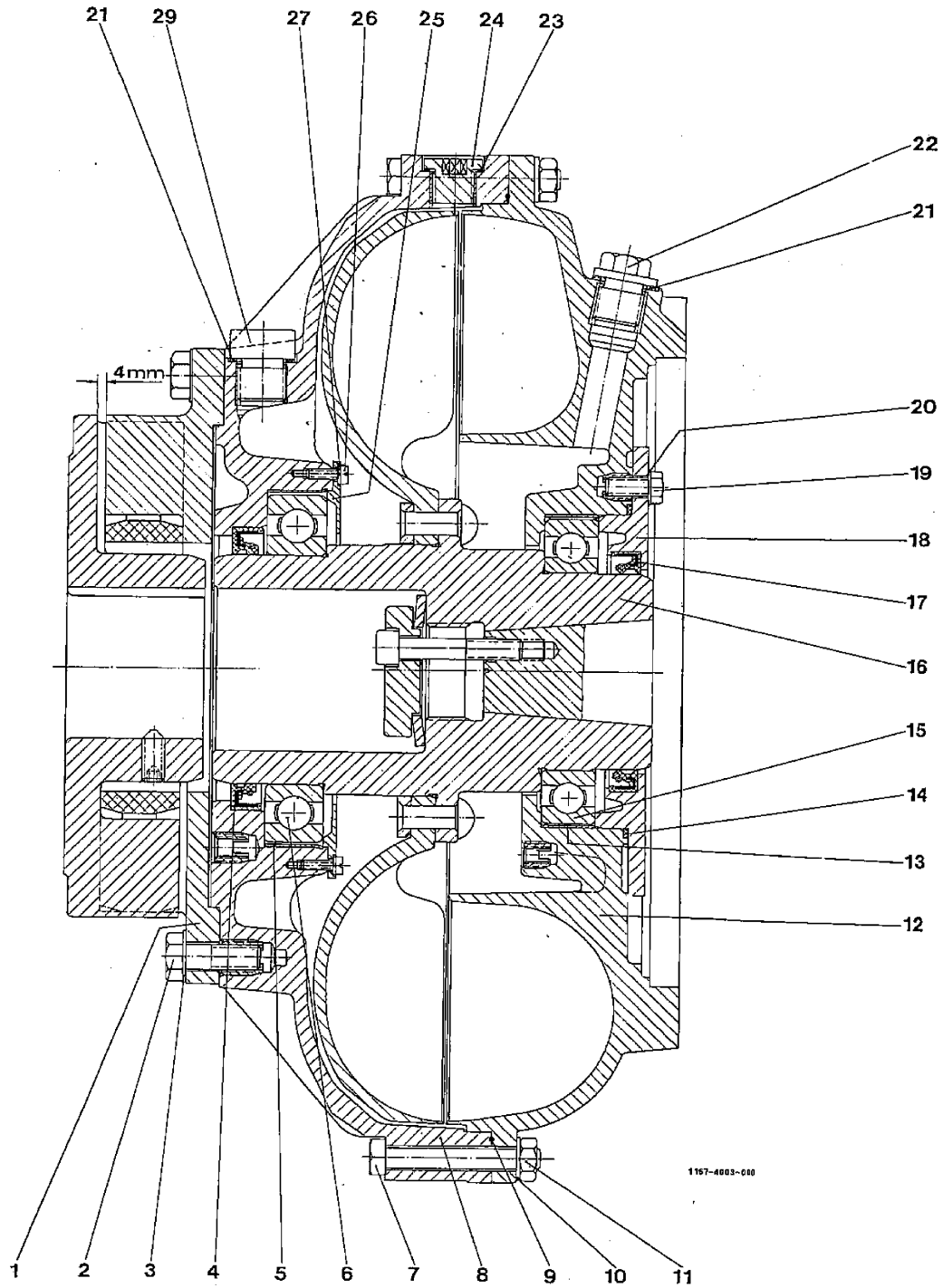


Fig. 16

Operating-water connection

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No. in Fig.	Part - No.	Qty.	Part Description
-	8134-2100-270	1	Operating-water connection with protecting case (1-27 and 36-41)
1	0013-2842-300	1	Grooved coupling nut F25 DIN 11851
2	0018-3939-300	1	Cone connection D25 DIN 11851
3	0007-2208-750	4	Gasket G 25 DIN 11851
-	8134-2201-010	1	Pipe line, complete (4a-d)
4a	0018-4502-400	1	Threaded connection 25/R1"
4b	0018-2525-640	1	Strainer R 1"
4c	0018-1609-300	1	Bend
4d	0013-2842-300	1	Grooved coupling nut
5	0018-4086-400	3	Threaded connection 25/R 1"
6	0018-1741-000	1	Water pressure reducer, complete
6a		2	* Gasket
6b		2	* Threaded connection
6c		2	* Coupling nut
6d	0001-0299-610	2	* Pressure gauge
7	3014-2166-000	1	Connection pipe
8	0019-0137-300	1	Hex head screw R 1/4" x 12
9	0004-5268-880	2	Gasket 13/19x1.5
10	8134-2195-000	1	Connection piece
11	0018-0961-300	2	Double nipple 3/8"
12	0018-3711-600	2	Solenoid valve 3/8"
15	0018-3854-300	4	Connection piece 10/R3/8"
16	0013-2818-400	4	Coupling nut R 3/4"
17	0007-2230-750	4	Gasket 15.5/21.5 x 4
18	0018-4645-300	2	Threaded connection R 3/4" R 3/8"
19	0018-4646-300	2	Threaded connection R 3/4" R 1/2"
20	0018-1710-640	2	Ball valve 1/2"
21	0018-1788-300	2	Reducing nipple 1/2" / 3/8"
22	8134-2201-040	1	Pipe line
23	0007-2402-750	2	Gasket 17/23 x 3
24	0018-4645-300	1	Threaded connection R 3/4" / R 3/8"
25	8134-2193-110	1	Connection piece
26	0018-1299-640	2	Upper part of valve 1/2" DIN 3519, cpl.
26a	0004-5276-710	2	* Gasket 22/26 x 1
27	0001-0299-610	2	Pressure gauge
-	8134-2355-020	1	Protecting case
-	0005-3355-630	1	Cable gland Pg 9
-	1165-2350-000	1	Pressure switch assembly (30-31)
30	0018-1870-000	1	Low-pressure hose, complete
30a	0018-3465-400	1	* Screw coupling DL 8 DIN 2353 R 1/4"
30b	0018-3560-400	1	* Screw coupling DL 8 R 3/8"
31	0005-0675-900	1	Pressure switch F 5
36	0005-3358-630	1	Cable gland Pg 9
37	0019-2376-630	2	Fillister head screw AM 4x16 DIN 84
38	0005-0862-900	1	Branch box
39	0005-0222-630	1	Plug Pg 9
40	0005-0203-630	1	Cable gland A Pg 11 x A DIN 46255
41	0005-0772-608	1	Protecting hose

* This part is included in the preceding "complete" part, but it is also available as separate item.

Operating-Water Connection
 SI 1170-004

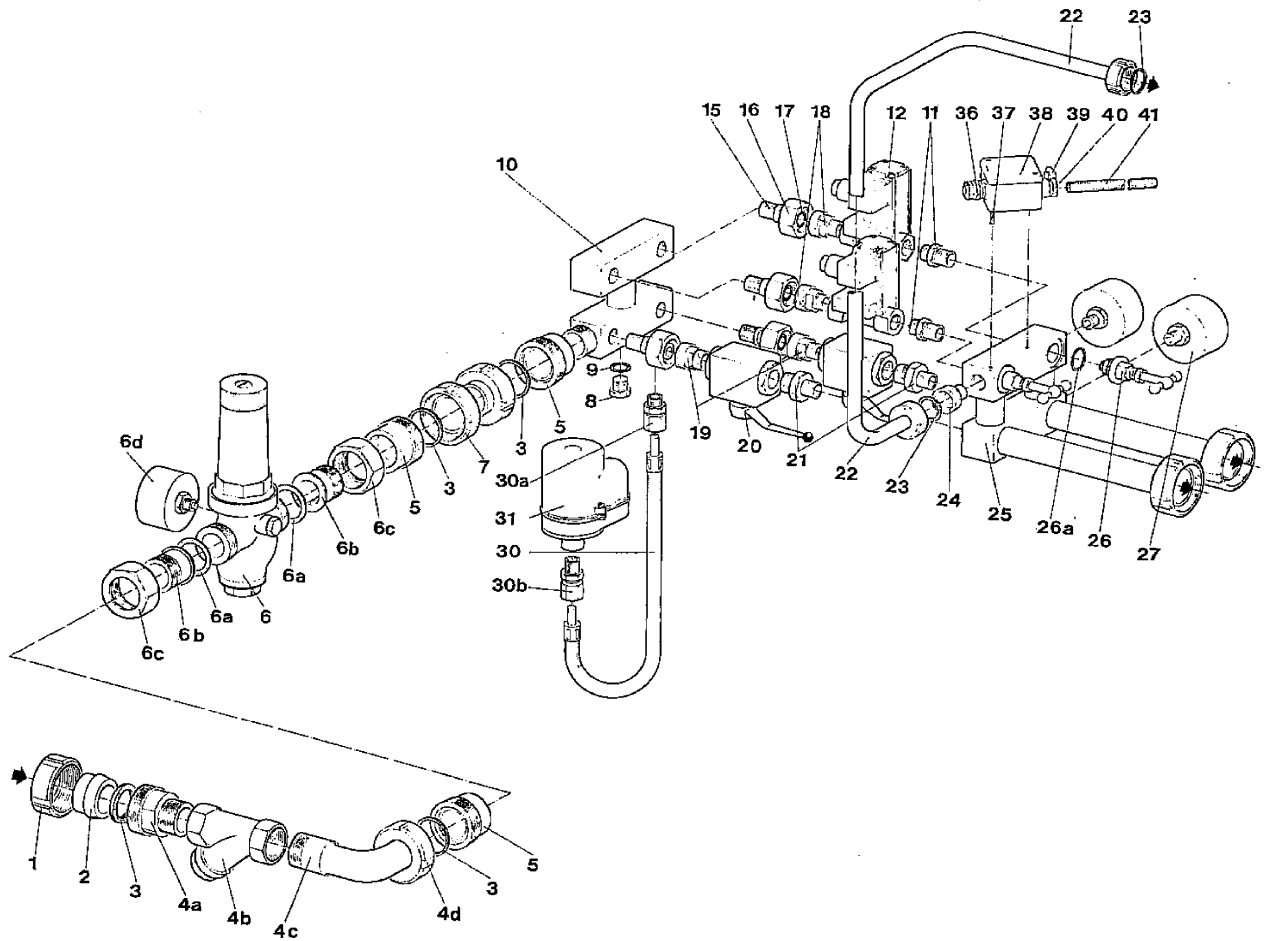
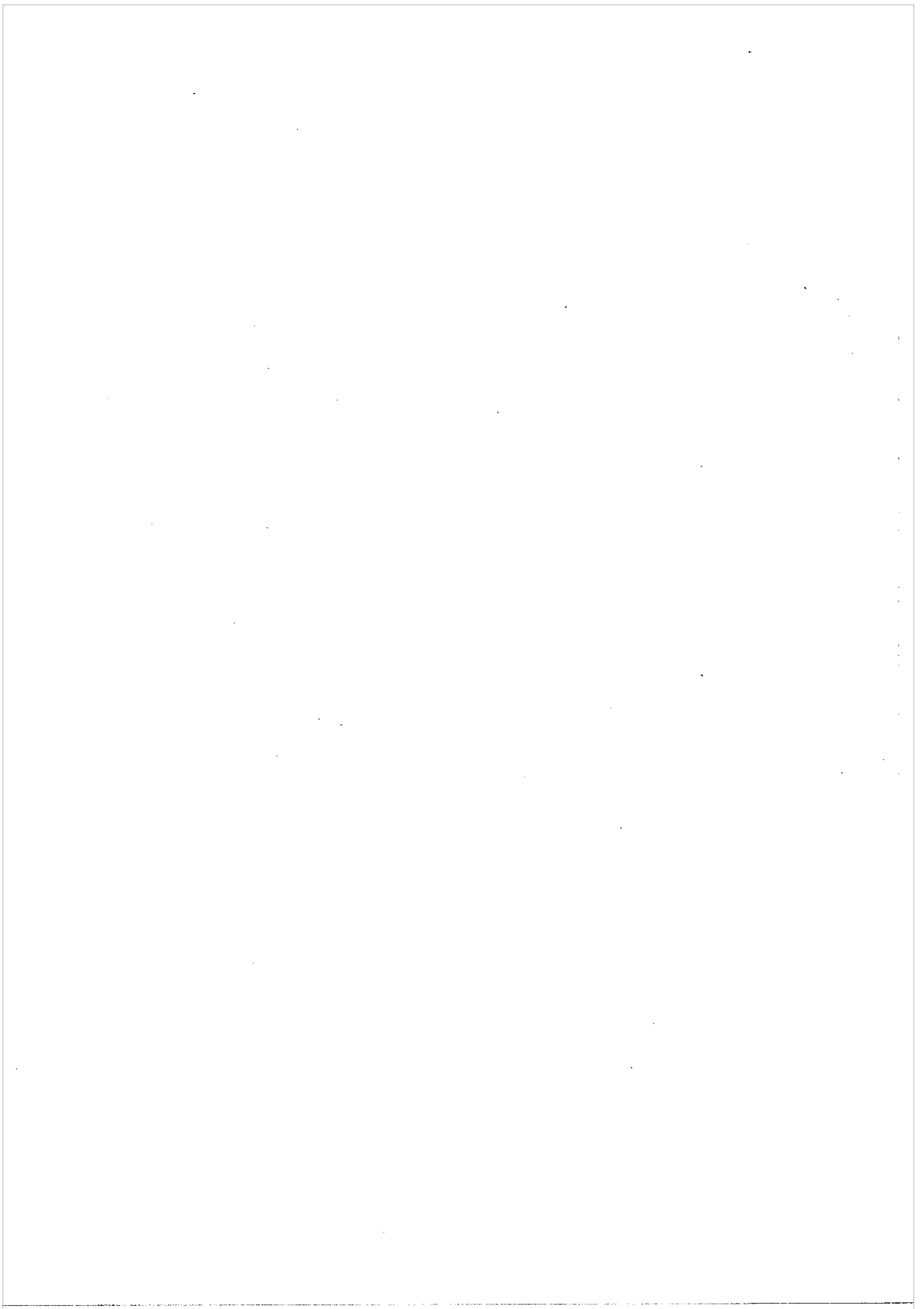


Fig. 17/1



Solenoid Valve R 3/8"

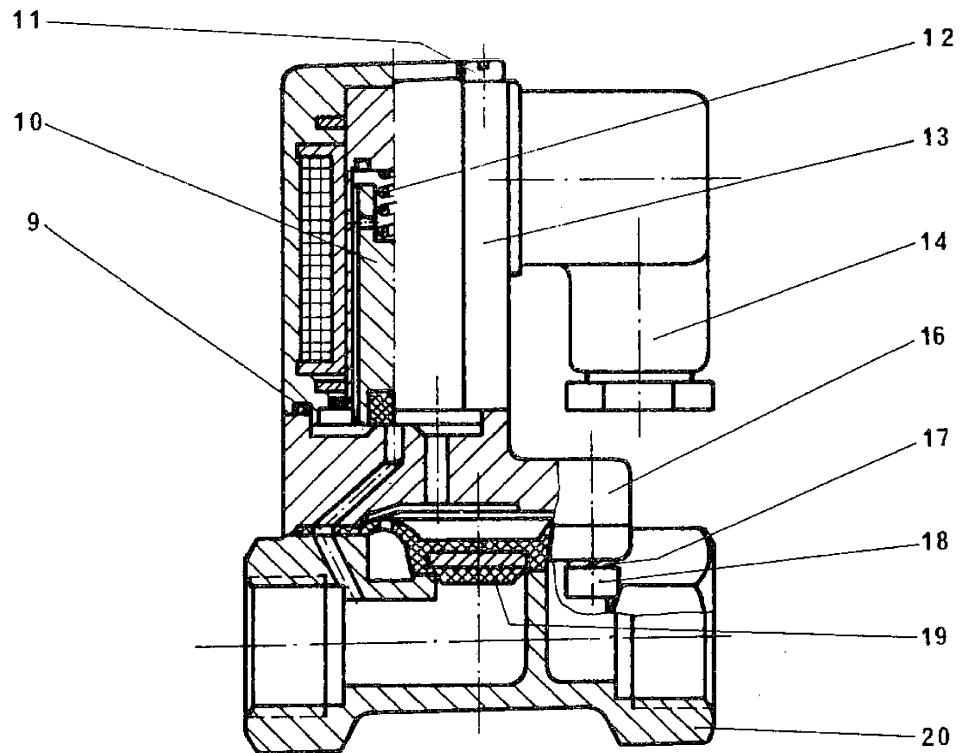


Fig. 17/2

No. in Fig.	Part - No.	Qty.	Part Description
-	0018-3711-600	1	Solenoid valve, complete (9-20)
9	0007-1946-750	1	Gasket 25/1.5
10	0018-3710-040	1	Solenoid core
11	0019-2387-400	4	Cylindrical screw M 4x55 DIN 84
12	0006-4079-300	1	Pressure spring
13	0018-3710-800	1	Solenoid head 50/60 Hz
14	0018-3710-050	1	Coupler socket
15			
16	0018-3711-070	1	Valve cover
17	0026-1322-170	4	Lock washer A4 DIN 127
18	0019-6077-400	4	Allen screw M 4x10 DIN 912
19	0018-3711-750	1	Diaphragm
20	0018-3711-080	1	Valve housing

Feed and Discharge Connections and Centripetal Pump

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No. in Fig.	Part - No.	Qty.	Part Description
-	1167-2296-030	1	Feed and discharge connections, complete
1a	0018-3955-300	1	Cone connection D 50 DIN 11851
1b	0013-2845-300	1	Grooved coupling nut F 50 DIN 11851
1c	0007-2211-750	1	Gasket G 50 DIN 11851
1d	1167-2190-020	1	Handle connection piece
-	1167-2295-030	1	Skim milk discharge, complete (2a-u)
2a	0007-2210-750	1	Gasket G 40 DIN 11851
2b	0007-2211-750	1	Gasket G 50 DIN 11851
2c	1167-2285-030	1	Skim milk discharge
2d	0007-2279-750	1	Gasket 56/68 x 6
2f	0013-2845-300	1	Grooved coupling nut F 50 DIN 11851
2u	0007-2564-750	1	Gasket 170/3
3	8918-2100-050	1	Pressure gauge
4	8266-2310-150	1	Constant pressure valve NW 65/50
6	see page 18/3	1	Flowmeter (see fig. 18/2)
-	1167-2289-000	1	Cream discharge, complete (7a-s)
7a	0007-2373-840	1	Gasket 35.5/47 x 5
7b	0007-2882-750	1	Gasket 35/47 x 6
7c	1167-2386-000	1	Cream discharge with valve housing
7d	0007-2892-750	1	Gasket 40/52 x 6
-	1166-2272-010	1	Valve cone assembly (7f-k)
7f	1166-2278-010	1	Valve cone
7g	0004-5720-840	1	Grooved ring 24/45
7h	1166-2268-000	1	Washer
7k	0026-2118-300	1	Snap ring
-	1166-2202-000	1	Adjusting screw assembly (7m-s)
7m	0013-2844-300	1	Grooved coupling nut F 40 DIN 11851
7n	1166-2217-000	1	Guide ring
7p	0013-0085-300	1	Knurled nut M 18x1.5
7r	1166-2276-000	1	Adjusting screw
7s	0026-0057-850	1	Washer
8	0018-3949-300	1	Cone connection D 40 DIN 11851
9	0013-2844-300	1	Grooved coupling nut F 40 DIN 11851
10	0007-2210-750	2	Gasket G 40 DIN 11851
-	1167-2213-080	1	Centripetal pump assembly (11a-c)
11a	1167-2252-000	1	Skim milk pump 140 ϕ (up to 5.0 bars max.)
11b	1167-2241-030	1	Cream pump 140 ϕ (up to 5.0 bars max.)
11c	1167-2246-010	1	Feed tube

Feed and Discharge Connections and Centripetal Pump
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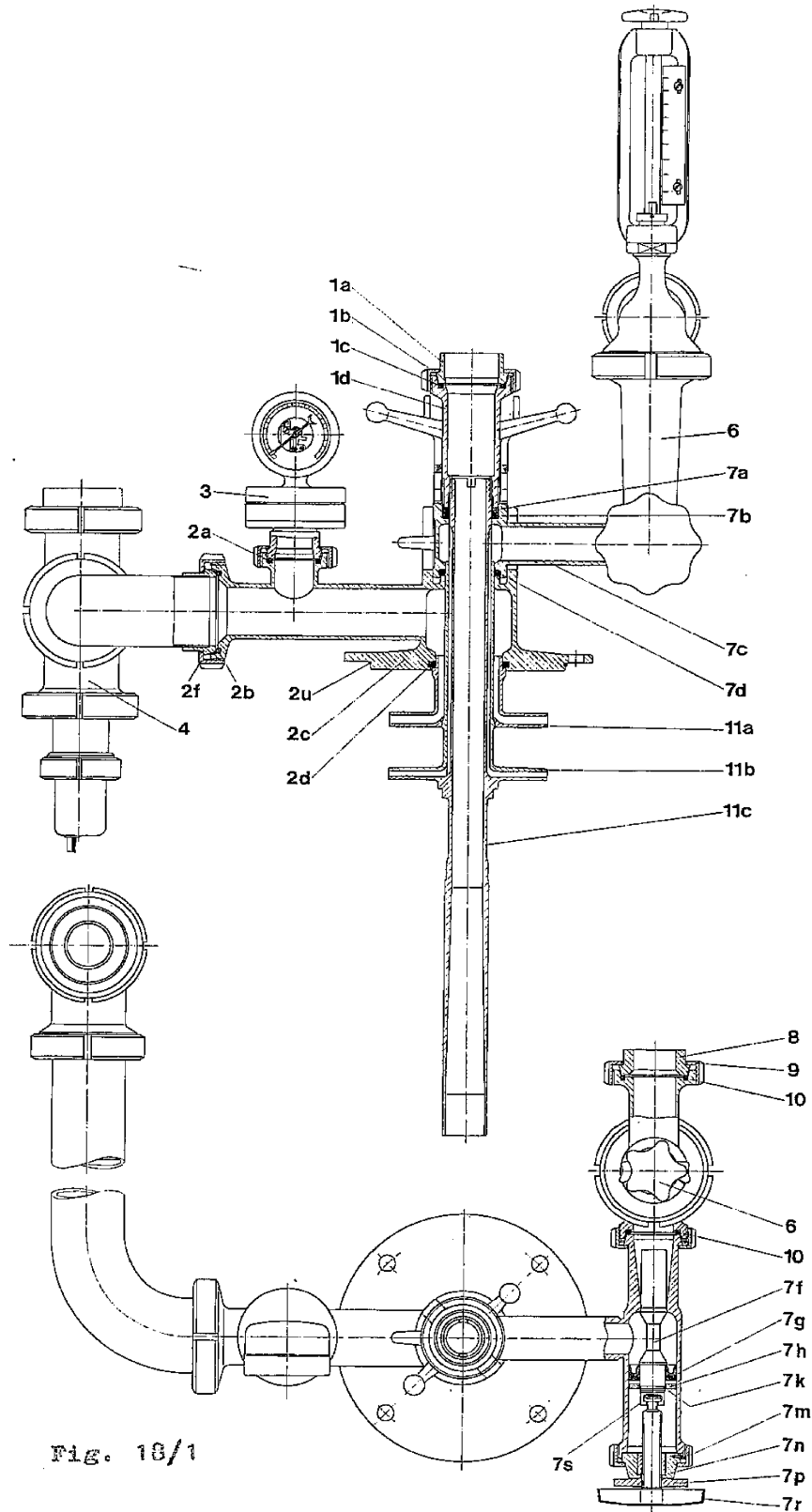


Fig. 18/1

Flowmeter

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No. in Fig.	Part - No.	Qty.	Part Description
Measuring range			
	700 - 4000 l/h f.cream discharge	6000 - 30000 l/h for feed	
-	8021-2000-090	8022-2100-080	1 Flowmeter assembly (1-16)
1	0019-1731-300	0019-1731-300	1 Handle screw
2	0007-2298-750	0007-2298-750	2 Gasket 13,5/22 \varnothing x 10
3	0001-0083-820	0001-0082-820	1 Cylindrical sight glass
4	0019-1380-300	0019-1380-300	1 Threaded bush
5	0026-1375-300	0026-1375-300	1 Washer
6	0013-3010-300	0013-3010-300	1 Nut M 35x1,5
7	8021-2003-120	8022-2003-080	1 Outlet pipe
8	-	0007-2341-750	1 Gasket 85/95 \varnothing x 6
8	0007-2279-750	-	1 Gasket 56/68 \varnothing x 6
9	0013-2846-300	0013-2847-300	1 Grooved coupling nut
10	8021-2001-150	8022-2001-110	1 Inlet cup
11	8021-2012-010	8022-2112-000	1 Float
12	-	8022-2117-000	1 Scale 6000 - 30000 l/h
-	8021-2017-000	-	1 Scale 700 - 4000 l/h
13	0004-5261-720	0004-5261-720	2 Gasket 4,5/8,5 x 1
14	0019-2478-300	0019-2478-300	2 Lens head screw AM 4x8 DIN 85
15	8020-2002-000	8022-2002-000	1 Intermediate piece
16	-	0007-2211-750	2 Gasket G 50 DIN 11851
16	0007-2210-750	-	2 Gasket G 40 DIN 11851

Flowmeter
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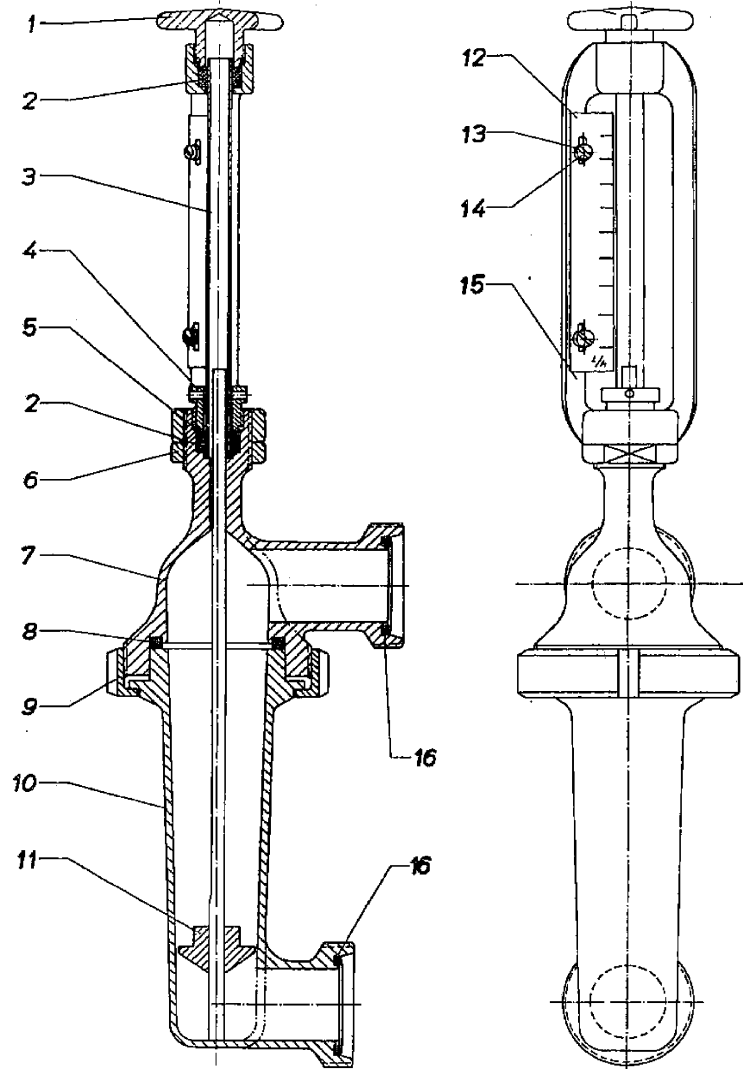


Fig. 18/2

B o w l

No. in Fig.	Part - No.	Qty.	Part Description
-	1170-6600-L	1	Bowl, complete (1-23)
1	0019-1450-400	1	Threaded plug
2	0007-1970-690	1	Gasket 26.5/35x5.25
3	3159-6280-000	1	Piston valve assembly (3a-f)
3a	3159-6281-000	1	Valve housing
3b	0007-2920-750	3	Gasket 23.3/2.4
3c	0004-2341-840	1	Gasket 6/9.9x10.5
3d	0007-2923-750	2	Gasket 9.3/2.4
3f	3159-6276-000	1	Valve piston
4	1170-6501-000	1	* Sliding piston
5	0007-2962-750	1	Gasket 611/635x12
7	1167-6604-050	1	* Bowl bottom, complete
7a	3117-6609-010	1	** Arresting piece
7b	0019-2233-400	1	** Fillister head screw AM 5x12 DIN 84
7c	0007-2564-750	1	Gasket 170/3
7d	0007-2944-750	1	Gasket 140/3
7f	0019-6112-400	4	Allen screw M 6x35 DIN 912
7g	1167-6597-000	1	Ring
8	1167-6631-010	1	* Lock ring S 680x14 (left-hand thread)
-	1170-6660-000	1	Set of discs (9a-f)
9a	1167-6662-010	1	Bottom disc
9b	1167-6663-040	4	Disc
9c	1167-6663-020	211	Disc
9d	1167-6664-010	1	Compensating disc
9f	1165-6666-000	1	Top disc
10	0007-2586-750	1	Gasket 108/10
11	1170-6620-000	1	* Distributor
14	0007-2546-750	1	Gasket 600/5
15	0007-2969-840	1	Gasket 579.7x11
16	0013-2964-400	1	Spindle nut, complete
16a	0007-2597-750	1	** Gasket 50/4
17	1170-6610-010	1	* Bowl top
18	1167-6650-020	1	Separating disc
19	1167-6670-030	1	Upper disc (specially shaped)
21	1167-6645-000	1	Centripetal pump chamber cover
22	0007-2854-750	1	Gasket 190/202x6
23	1165-6631-000	1	Lock ring Tr 215x6 (left-hand thread)

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because of special re-fitting to machine and possible re-balancing of bowl.

** This part is included in the preceding "complete" part, but it is also available as separate item.

Bowl
Bowl

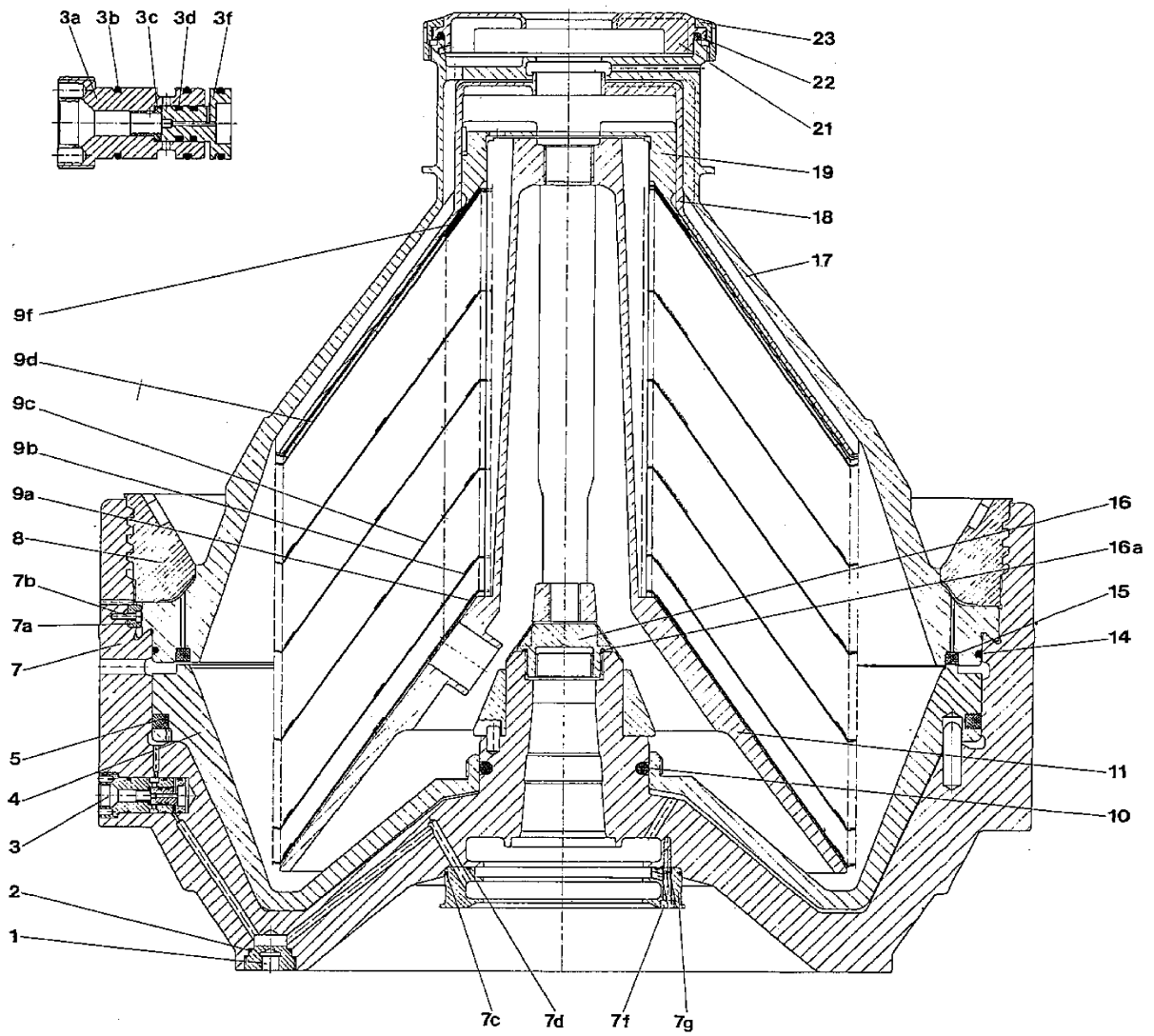


Fig. 19

Tools and Accessories

All the parts mentioned in the packing list furnished with the separator should be found in the packing case.

No.in Fig.	Part-No.	Qty.	Part Description
401	0003-3774-320	1	Allen wrench 4 DIN 911
-	0003-3775-320	1	Allen wrench 5 DIN 911
-	0003-3776-320	1	Allen wrench 6 DIN 911
-	0003-3777-320	1	Allen wrench 8 DIN 911
-	0003-3778-320	1	Allen wrench 10 DIN 911
-	0003-3780-320	1	Allen wrench 14 DIN 911
402	0003-4080-110	1	Single-ended wrench 50 (for spindle nut)
403	0003-4202-320	1	Double-ended wrench 10x13 DIN 3110
-	0003-4205-320	1	Double-ended wrench 17x19 DIN 3110
-	0003-4208-320	1	Double-ended wrench 22x27 DIN 3110
-	0003-4209-320	1	Double-ended wrench 24x30 DIN 3110
-	0003-4211-320	1	Double-ended wrench 27x32 DIN 3110
-	0003-4222-320	1	Double-ended wrench 36x41 DIN 3110
404	0003-3846-000	1	Pivoted hook wrench 90/155
405	0003-0200-000	1	Mallet
406	0003-0303-000	1	Splash cover
407	0003-0256-890	1	Oil gun
408	0003-0168-890	1	Funnel
409	0003-0277-800	1	Oil cup
410	0003-4695-960	1	Brush 70x100x500
411	0003-4667-800	1	Rotary brush 41/26x213
412	0003-4690-960	1	Brush 35x125x285
413	0003-4540-960	4	Cylindrical brush 10x40x160
-	0003-4544-960	4	Cylindrical brush 15x85x285
-	0003-4551-800	1	Cylindrical brush 20x100x800
-	0003-4552-960	1	Cylindrical brush 45x110x270
414	1087-9910-010	1	Puller (for cam hub, fluid clutch)
415	0018-3430-030	1	Tube M 22x1.5x200 (for fluid clutch)
416	0003-0590-000	1	Torque wrench
417	0003-0601-320	1	Socket 8
418	0984-9862-000	1	Spindle lifting device
419	1166-9910-010	1	Forcing tool (for fluid clutch and brake pulley)
420	0003-4636-050	1	Screwdriver 4.5x125
-	0003-4637-050	1	Screwdriver 8x150
425	0003-0353-000	1	Annular wrench (for large lock ring)
426	0003-4002-000	1	Annular wrench (for small lock ring)
427	1166-9840-000	1	Lifting device (for bowl top)
428	1165-9960-000	1	Jack (for sliding piston)
428a	1166-9805-000	1	Pressure piece (included in jack 428)
429	0003-0135-000	1	Wrench (for feed tube)
430	1170-9820-000	1	Disc stack compressing device (430a-d)
430a	1167-9851-020	1	Threaded ring
430b	1167-9770-000	1	Hydraulic compressing device
430c	1167-9939-000	1	Disc
430d	1170-9877-000	1	Bolt
431	2301-9970-000	1	Lifting device (for annular wrench with lock ring)
432	0003-0575-000	1	Pin punch C5 DIN 6450
434	1170-9970-000	1	Lifting device (for distributor)
435	1165-9840-010	1	Lifting device (for hood)
436	3050-9930-000	1	Jack (for bowl bottom)
437	0003-3727-030	1	Wrench M4 (for valve piston)
438	1165-9895-010	1	Wrench (for bowl valve)
439	1168-9823-000	1	Adjusting ring
-	0015-0014-080	5	2.5-litre can of separator lubricating oil C-LP 114; Viscosity at 50 °C: 114 + 8 cSt
-	0015-0050-090	2	5-litre can of clutch oil TD-L16
-	0015-0113-000	2	Tube of special type grease (for threads on bowl)
-	0015-0121-000	1	0.85 kg can of ball and roller bearing grease K-L3k DIN 51825

Tools and Accessories

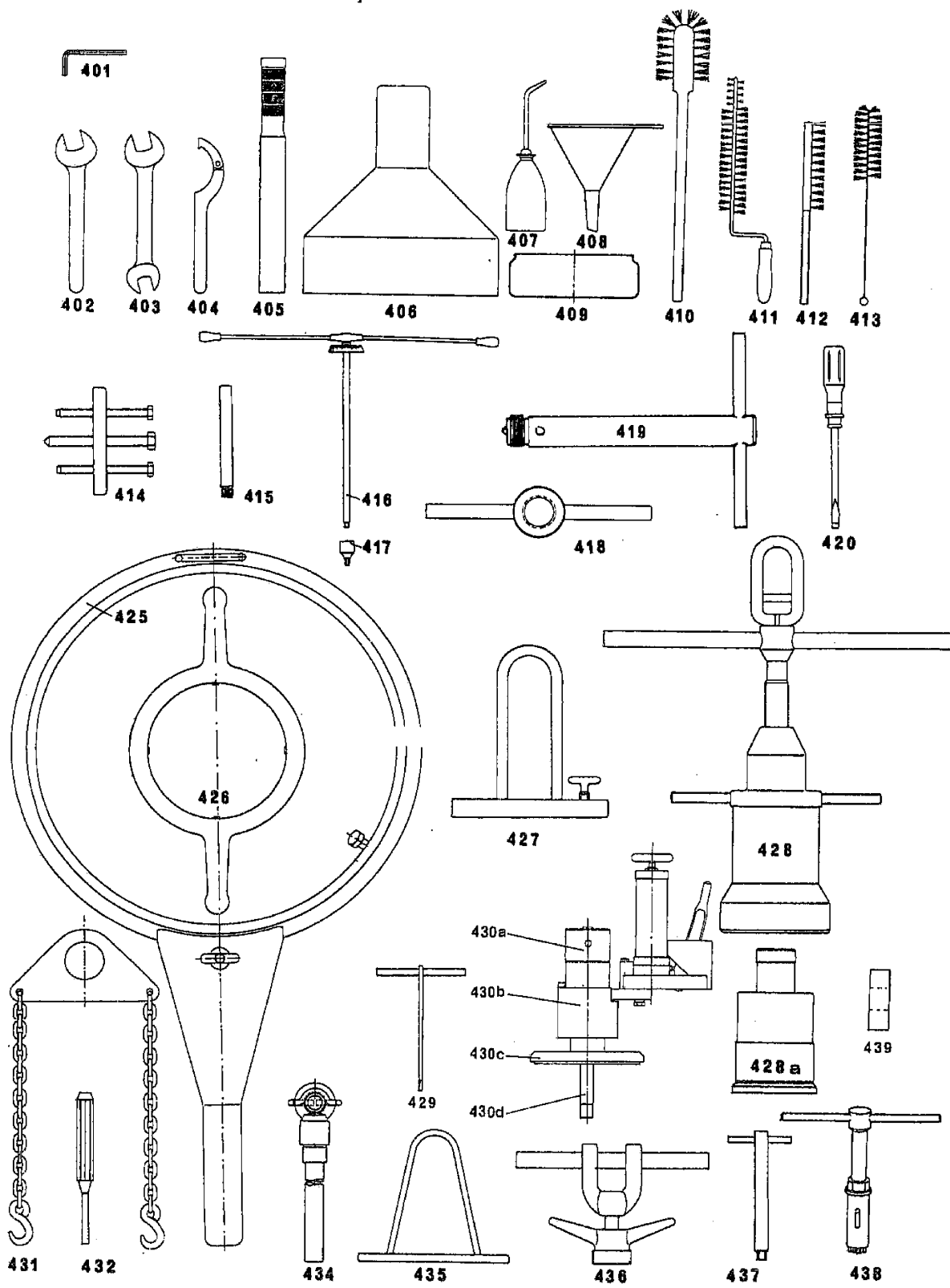


Fig. 20

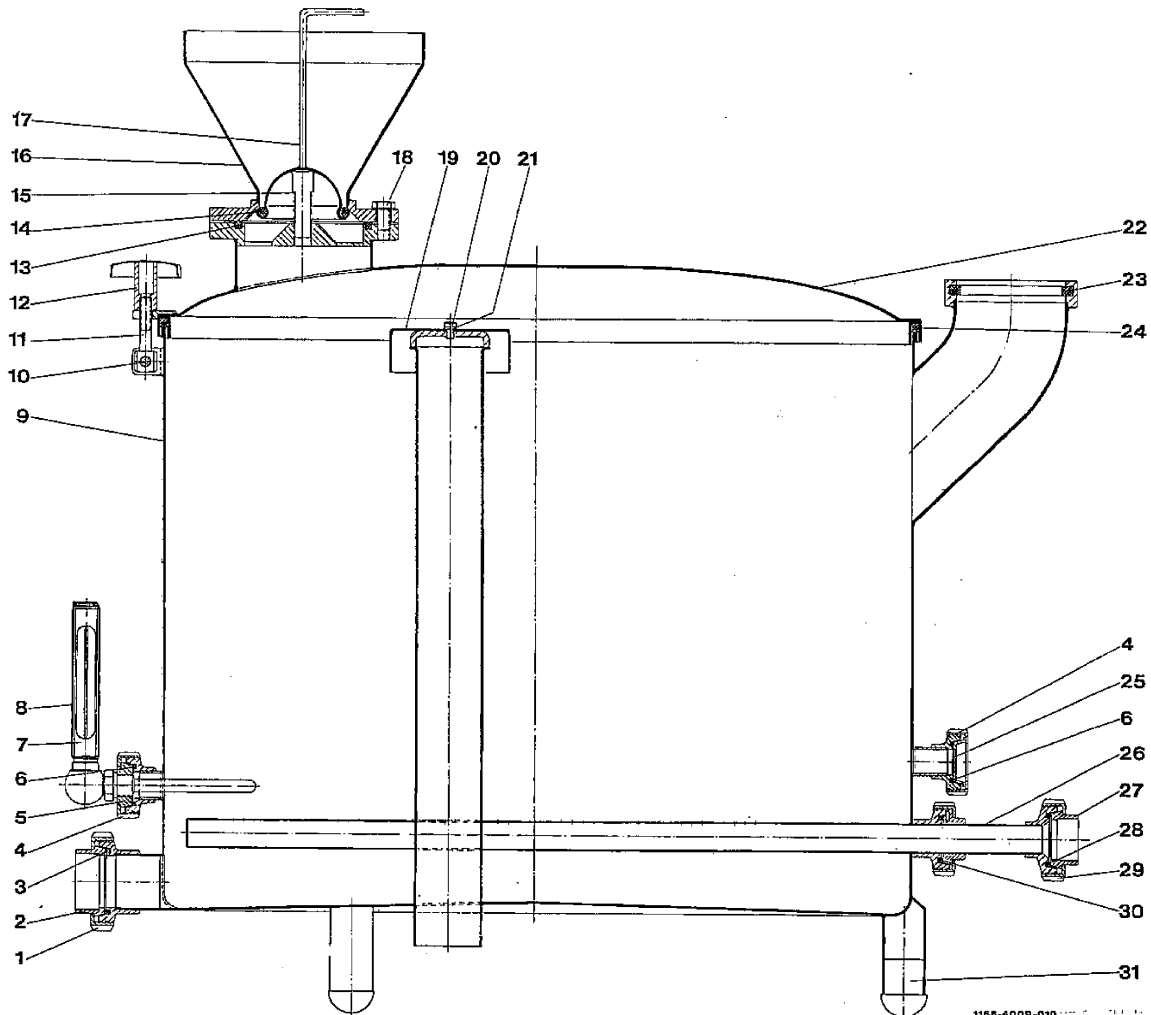
1167-

Sterilizing Tank

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No. in Fig.	Part - No.	Qty.	Part Description
-	1165-9200-040	1	Sterilizing tank assembly (1-31)
1	0013-2845-300	1	Grooved coupling nut F 50 DIN 11851
2	0018-3955-300	1	Cone connection D 50 DIN 11851
3	0007-2211-750	1	Gasket G 50 DIN 11851
4	0013-2842-300	2	Grooved coupling nut F 25 DIN 11851
5	0018-4269-400	1	Cone connection R 1/2"
6	0007-2208-750	2	Gasket G 25 DIN 11851
7	0001-0675-400	1	Angle thermometer
8	1165-9462-000	1	Bush
9	1165-9210-030	1	Sterilizing tank
10	0026-1102-400	6	Cylindrical pin
11	0019-1363-300	6	Hinge screw
12	0021-3128-300	6	Handle screw
13	0007-2121-750	1	Gasket 118/130x7
14	0007-2483-750	1	Gasket 65/10
15	0006-4081-400	1	Cylindrical pressure spring
16	1165-9698-010	1	Funnel
17	1165-9277-000	1	Cap
18	0019-6966-400	3	Hex head screw M 12x20 DIN 933
19	0026-2108-400	1	Cap
20	0019-2507-300	1	Lens head screw AM 6x10 DIN 85
21	0026-1382-400	1	Washer 6,4 DIN 125
22	1165-9208-020	1	Cover
23	0007-2309-750	1	Gasket 92/112x10
24	0004-2364-758	1	Packing cord 8x8x2200
25	0001-0261-300	1	Blind cap
26	1165-9205-000	1	Flush pipe
27	0018-3949-300	1	Cone connection D 40 DIN 11851
28	0007-2210-750	1	Gasket G 40 DIN 11851
29	0013-2844-300	1	Grooved coupling nut F 40 DIN 11851
30	0007-2209-750	1	Gasket G 32 DIN 11851
31	0021-3155-700	3	Foot

Sterilizing Tank
=====



1166-4009-010

Fig. 21

Flow Constrictor

=====

~~On special order only.~~

Maximum throughput rate: 15 000 litres/h.

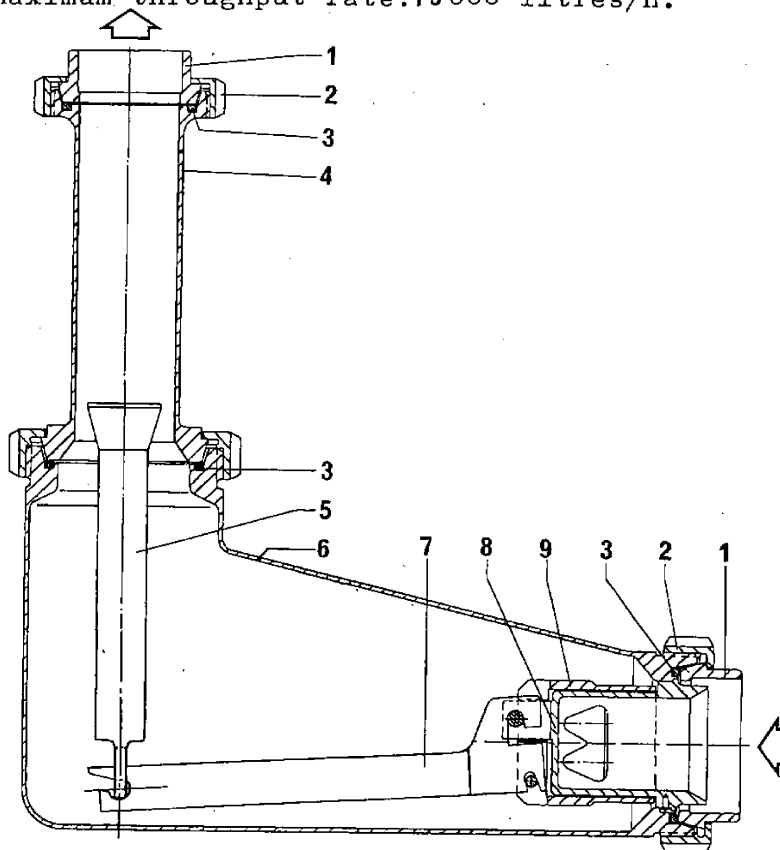


Fig. 22

IMPORTANT: Be sure to install the flow constrictor in such a manner that the inlet is fitted to a horizontal piece of pipe and the control tube 4 is directed vertically upwards.

No. in Fig.	Part - No.	Qty.	Part Description
-	8251-2150-070	1	Flow constrictor, complete (1-9)
1	0018-4636-400	2	Cone connection 65/50
2	0013-2846-300	2	Grooved coupling nut
3	0007-2212-750	3	Gasket G 65 DIN 11851
4	-	1	* Pipe
5	-	1	* Float
6	-	1	* Housing
7	-	1	* Throttling lever
8	-	1	* Throttling housing
9	-	1	* Regulating piece

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because its replacement requires re-adjustment of the flow constrictor. Therefore, when ordering this part, the flow constrictor must be returned to the factory.

Installation of the Flow Constrictor in the Piping of a Milk Processing Plant

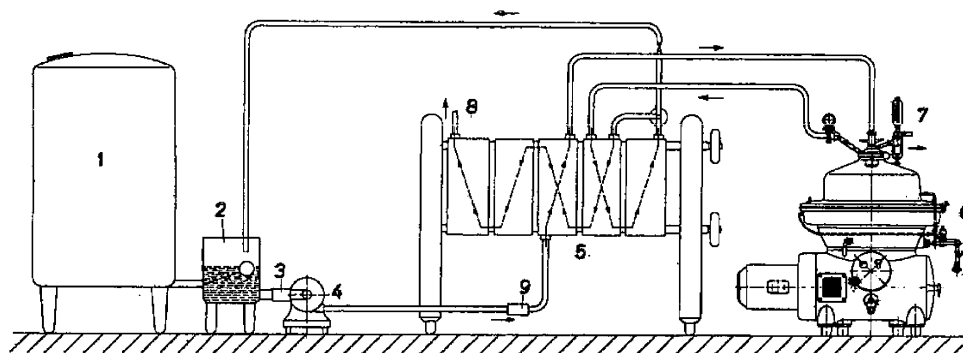


Fig. 1 Flow Constrictor between Pump and first Exchanger

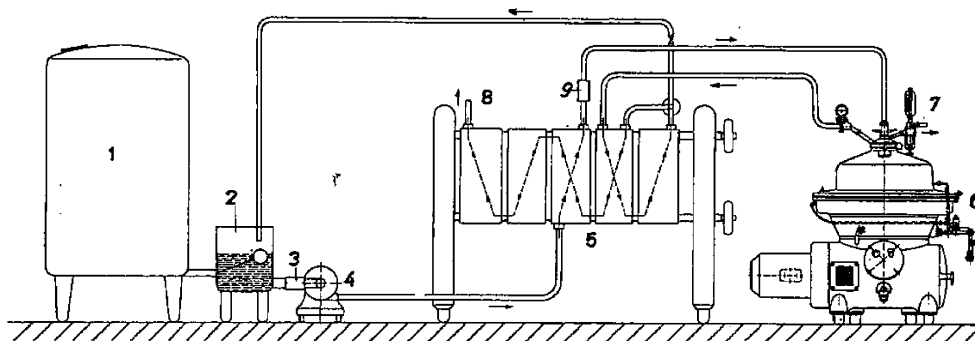


Fig. 2 Flow Constrictor between first Exchanger and Separator

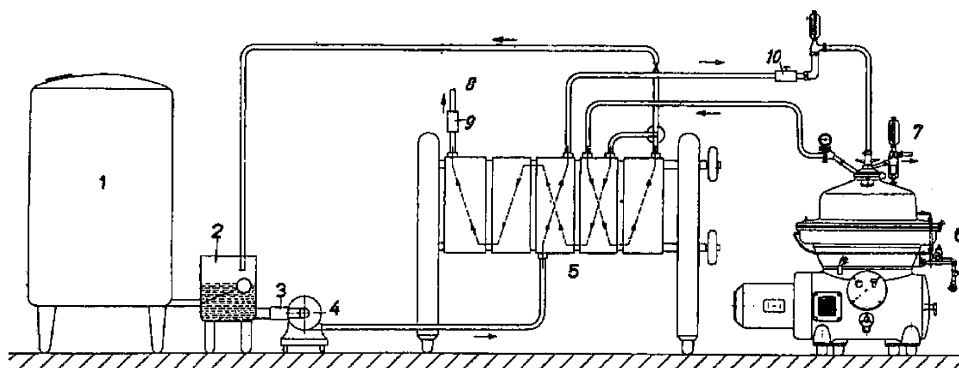
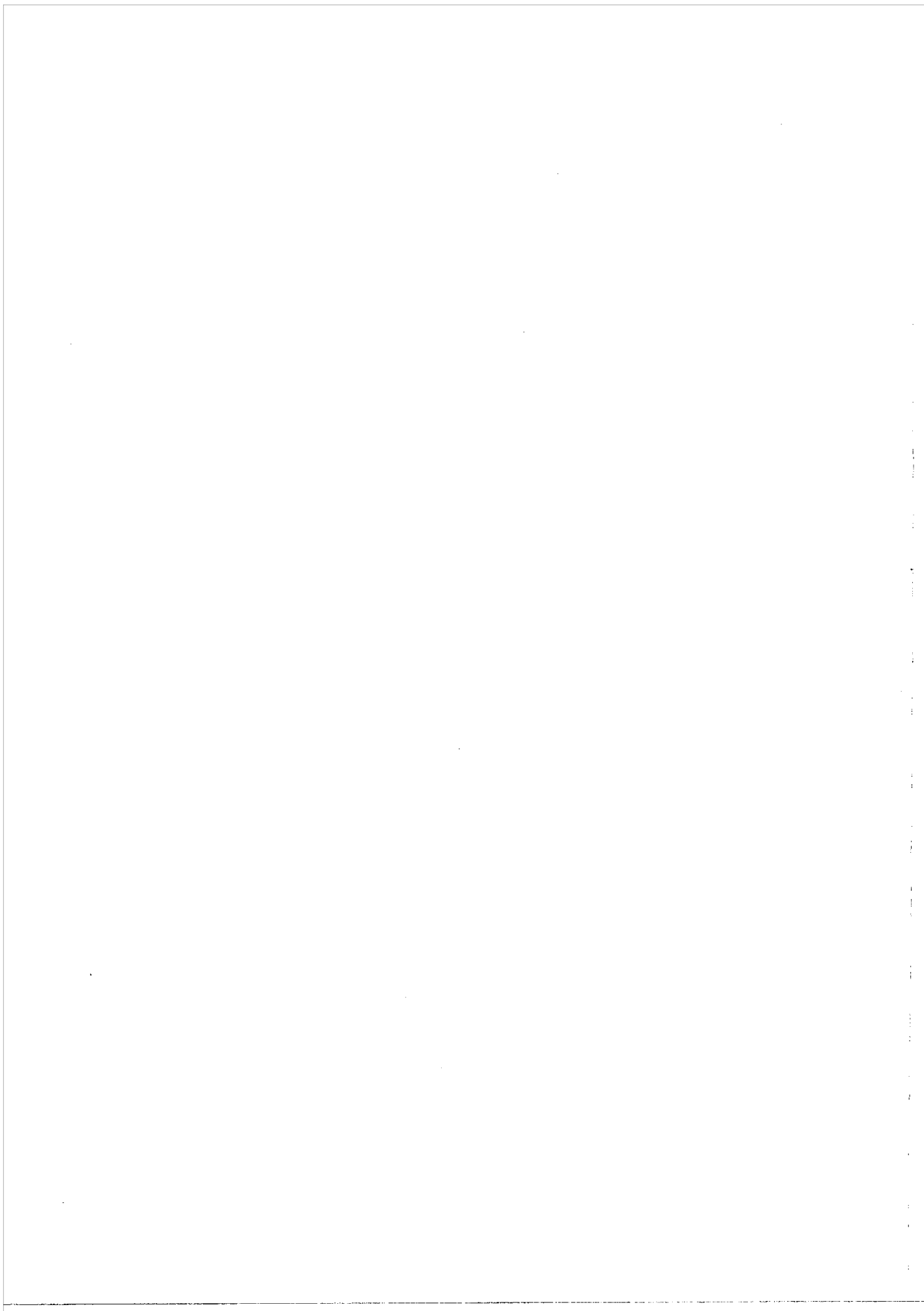


Fig. 3 Flow Constrictor behind the Cooler

Adjustable Flow constrictor and Flowmeter ahead of the Separator

- | | |
|---------------------|--------------------------------|
| 1 Storage tank | 6 Separator |
| 2 Balance tank | 7 Cream discharge |
| 3 Strainer | 8 to Storage tank |
| 4 Milk pump | 9 Flow constrictor |
| 5 Heater and cooler | 10 Adjustable flow constrictor |

Note! When installing the flow constrictor make sure its cylindrical part is in upright position so that the milk flows through it from below.



Interlock Device (supplied on special order)

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(Safety device for electro-mechanical locking of the hood)

When required, the separator can be equipped with a safety device that ensures electro-mechanical interlocking of the hood and top assembly while the bowl is rotating. This device has been designed with a view to preventing accidents which are likely to occur when fittings are being loosened before the bowl has stopped rotating.

The interlock device consists of a proximity switch, zero-rpm relay, solenoid, rectifier, limit switch, and the parts listed on page 23/2.

The annular top part of bow 2 must fit over the handle connection piece of the feed and discharge assembly. When the lower part of the arm is plugged into housing 15 attached to the separator frame, the limit switch 10, incorporated in the housing, closes the control circuit. This arrangement ensures that the drive motor cannot be started unless the hood has been installed and the handle connection piece has been screwed on.

After starting of the motor, solenoid 7 is actuated by the zero-rpm relay which is connected to the proximity switch monitoring the speed of the drive shaft. The locking pin of the solenoid snaps into the hole provided in the bow. As a result, the bow cannot be removed as long as the bowl is rotating.

When the drive motor has been switched off, the bow is unlocked by the zero-rpm relay as soon as the drive shaft and, hence, the bowl stops rotating. This is indicated by a pilot lamp. Only after this procedure it is possible to remove the bow and after it the hood together with the feed and discharge assembly.

In the event of power failure, the bow will remain locked even when the bowl has ceased rotating.

Interlock Device (on special order)

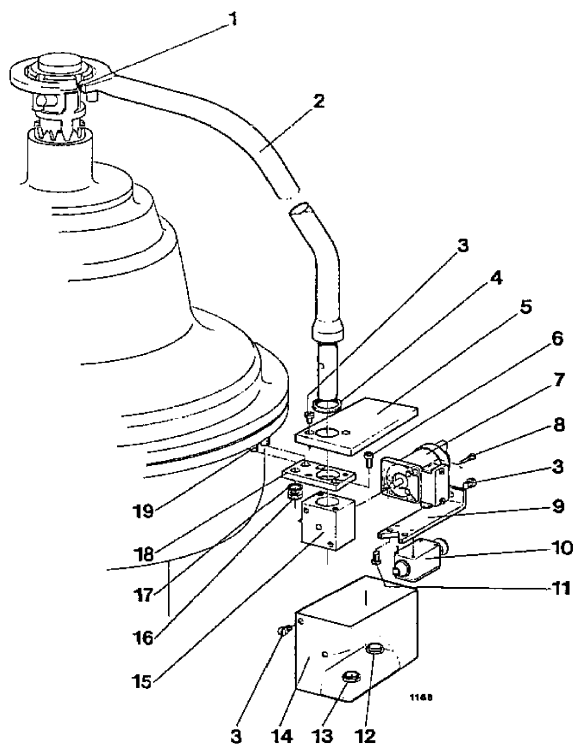


Fig. 23/1

Item No.	Part - Number	Qty.	Part Description
1	0007-2113-750	1	Gasket 94/104x6
2	1170-1248-000	1	Bow -
3	0019-2507-400	5	Lens-head screw AM 6x10 DIN 85
4	0007-2246-750	1	Gasket 30/38x4
5	1168-2354-000	1	Cover plate
6	0019-8353-400	2	Allen screw M8x12 DIN 6912
7	0005-1165-000	1	Solenoid
8	0019-2248-400	2	Fillister head screw AM 6x12 DIN 84
9	1168-1145-020	1	Holder
10	0005-0643-280	1	Limit switch
11	0019-8353-400	2	Allen screw M8x12 DIN 6912
12	0013-2868-630	2	Hexagon nut A PG 11 DIN 46258
13	0005-0203-630	2	Cable gland A PG 11xA DIN 46255
14	1168-2356-000	1	Protecting case
15	1168-2352-000	1	Housing
16	0013-0280-400	2	Hexagon nut M 12 DIN 934
17	0026-1328-300	2	Lock washer A 12 DIN 127
18	1168-1079-000	1	Plate
19	1168-1051-000	2	Threaded bolt

Items not shown in Fig.

-	0005-1087-000	1	Zero-rpm relay
-	0005-3452-000	1	Rectifier
-	0018-1749-600	1	Pressure-reducing valve
-	0005-0868-000	1	Proximity switch
-	1168-1192-000	1	Bracket



Take the Best – Separate the Rest

A company of mg technologies group

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