ALFA-LAVAL

INSTRUCTION BOOK

CREAM SEPARATOR

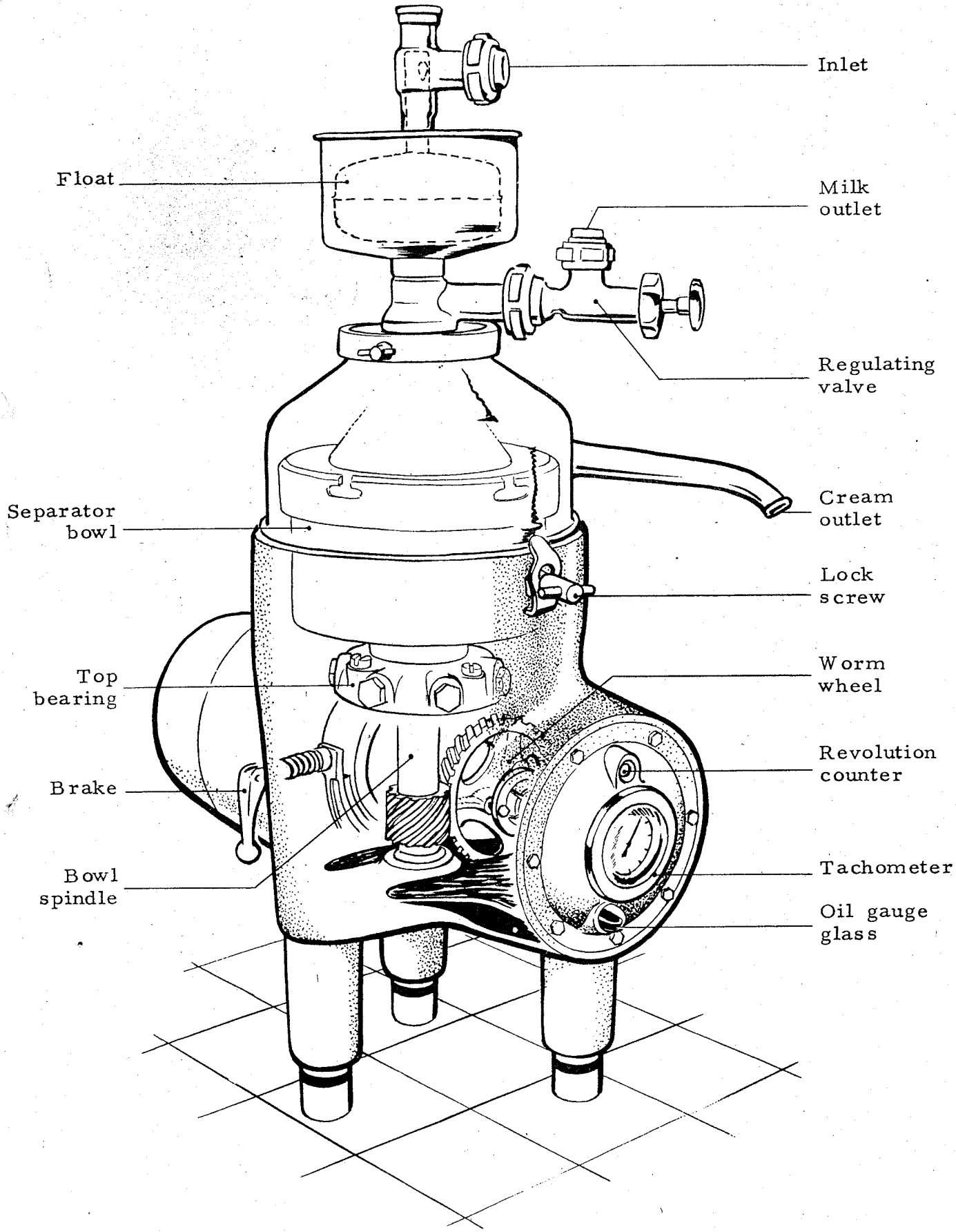
TYPE 2231M, 2231T and 2251M, 2251T

MANUFACTURING NUMBER: _____

2251 M

BOOK NO.: S69917E

PRINTED IN SWEDEN


Inlet
Float
Milk outlet
Regulating valve
Cream outlet
Separator bowl
Lock screw
Worm wheel
Top bearing
Revolution counter
Brake
Tachometer
Bowl spindle
Oil gauge glass

TYPE DENOMINATION

Type	Drive
2231M, 2251M	Flange motor 50 C/S
2231M-60, 2251M-60	Flange motor 60 C/S
2231T, 2251T	Transmission drive

CORRESPONDENCE. When ordering spare parts or returning parts for repairs, and in all other correspondence please always state:

- Type denomination of the separator - see type plate
- Manufacturing number of the separator - see top rim of bowl casing, or separator bowl
- Part name, part number and wanted quantity - see PARTS LIST of the Instruction Book.

UNPACKING

- Be careful not to scratch metallic or painted surfaces
- Check by means of the packing list that all parts have been unpacked.

THROUGHFLOW

Type	Milk		Whey	
	l/h	Imp. gal./h	l/h	Imp. gal./h
2231	1200	265	1600	355
2251	2000	440	3000	660

29 GAL T-H. AREA 0284M

SPEEDS in r.p.m.

	M-drive		T-drive
	50 C/S	60 C/S	
Worm wheel shaft	1420-1500	1700-1800	1420-1500
Tacho-meter	1420-1500	1700-1800	1420-1500
Revo-lution counter	71-75	85-90	71-75

SUITABLE MOTOR POWER

Type 2231 - 2 HP
Type 2251 - 3 HP

If the motor is not supplied together with the separator, consult an authorized ALFA-LAVAL representative about suitable type etc.

THE SEPARATOR BOWL MUST ROTATE CLOCKWISE

FLANGE MOTOR DRIVE ("M"-drive) - see page 23.

BELT GEARING ("T"-drive) - see also page 25.

Belt pulley of transmission shaft

The belt pulley should have a flat face. Its diameter is calculated as follows:

V = r.p.m. of transmission shaft

D = diameter of belt pulley of transmission shaft

$$\frac{173\ 000}{V} = D \text{ in mm}$$

$$\frac{6800}{V} = D \text{ in inches}$$

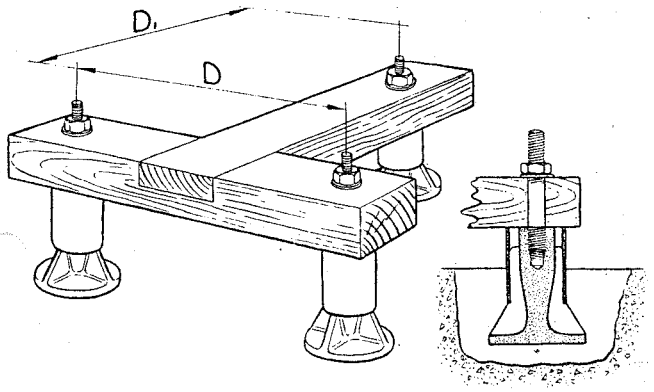
Speed of transmission shaft r.p.m.	Diameter of belt pulley of transmission shaft	
	mm	inches
195-205	850	33 1/2
205-220	800	31 1/2
220-235	750	29 1/2
235-255	700	27 9/16
255-275	650	25 5/8
275-295	600	23 5/8
295-310	575	22 5/8
310-325	550	21 5/8
325-340	525	20 11/16
340-355	500	19 11/16
355-375	475	18 11/16
375-395	450	17 11/16
395-420	425	16 3/4
420-445	400	15 3/4

Driving belt

The belt should be made of rubber or leather and its width should be 2" (50 mm). If a leather belt is used, its ends should be laced or glued together and not be joined by means of a belt claw.

MOUNTING

To line up the anchoring feet while cementing use preferably a wooden templet as shown in the illustration. Drill holes with 5/8" (16 mm) diameter in the templet according to measurements D and D1 in the dimensioned drawings on next turn-up.



Screw the short thread of stud bolts B14 into the anchoring feet. Slip sleeves B13 over the feet and fasten the latter to the templet by means of nuts B20. Place the anchoring feet in the holes in the floor and line up the templet by means of a spirit level so that the top rims of the sleeves are lying in one and the same horizontal plane. The feet must be sunk at least to such a depth that their conical portion is entirely embedded in the cement. When the cement has hardened, remove the templet and fill the sleeves to the upper rim with cement.

Then slip the washers B15, rubber cushions B16, guide sleeves B17, rubber cushions B18 and washers B19 over the stud bolts. Tighten the lower nuts B20 so that they are pressing lightly, but stably against the washers, and lock them with the upper nuts.

Put the frame in place and line it up by means of a spirit level, which should be placed on the rim of the bowl casing in the frame. Use the slotted adjusting washers B21, pushing them in between the frame foot and the flange of the guide sleeve as required. Tighten screws B22.

LUBRICATION

Fill oil into the worm gear housing - see directions on page 11.

PIPING

Feed and discharge pipes should be supported so as not to rest on the inlet and outlet parts of the separator.

CLEANING BEFORE FIRST USE

Unscrew large lock ring C9x) with spanner V6 and small lock ring C3 with spanner V7. The rings are left-hand threaded.

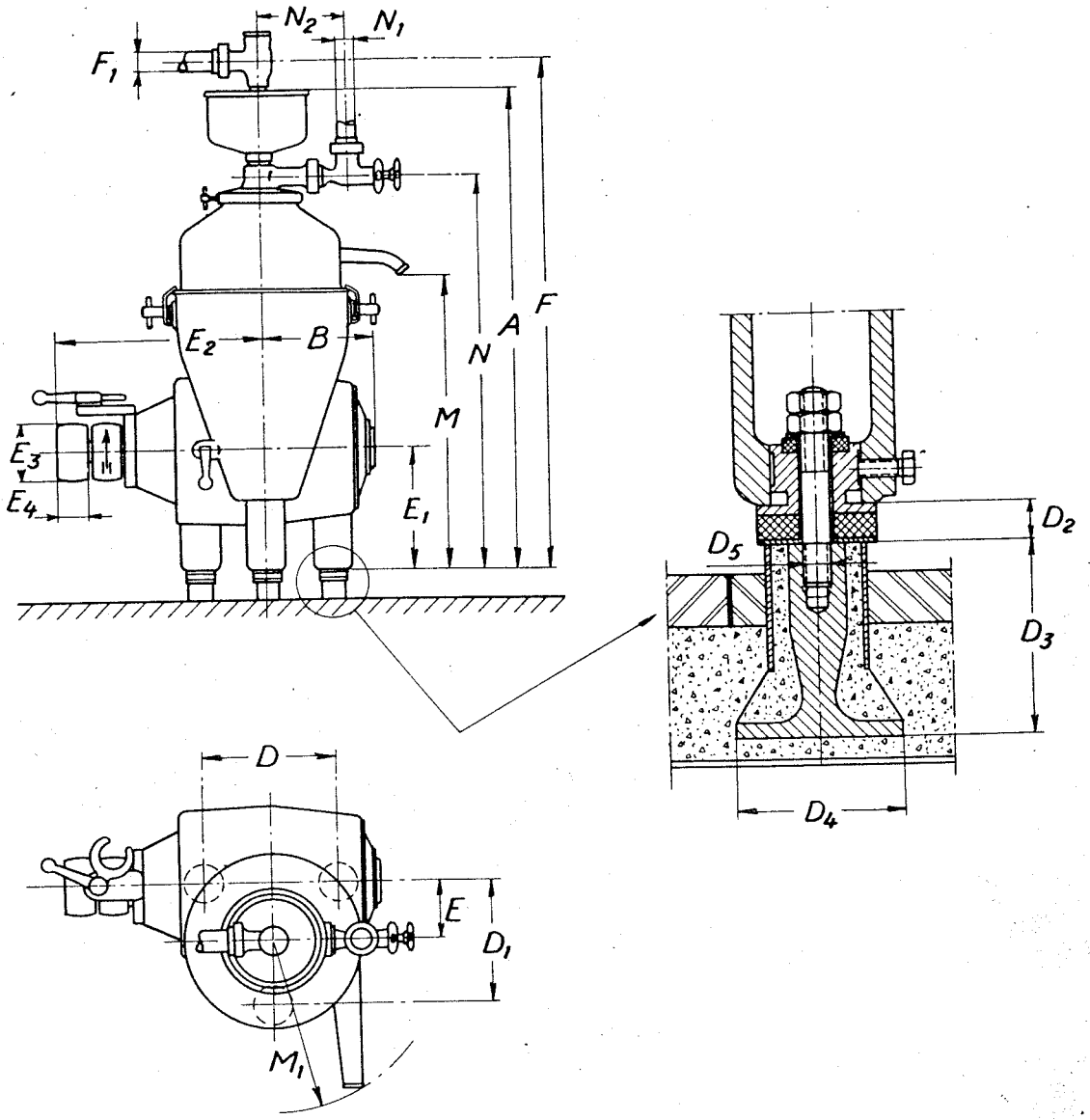
Lift off bowl hood C7 and remove top disc C4. Screw lifting tool V4 into the threaded hole of distributor C6 and lift out the latter with disc set. Place the distributor on the wooden stand.

The bowl discs are placed in numerical sequence on the distributor. The bottom disc is caulked on both sides and stamped No. 1. Always maintain this order, as otherwise the bowl could get out of balance.

Wash bowl parts, inlet and outlet parts, float, parts of regulating valve, frame hood and cap nut in hot water to which some soda has been added. Then flush them in clean, hot water. Hang the bowl discs spaced from each other on the disc drier. Flush the rubber rings in hot water and keep them flat. Keep the parts in a dry and warm place till the separator is to be used.

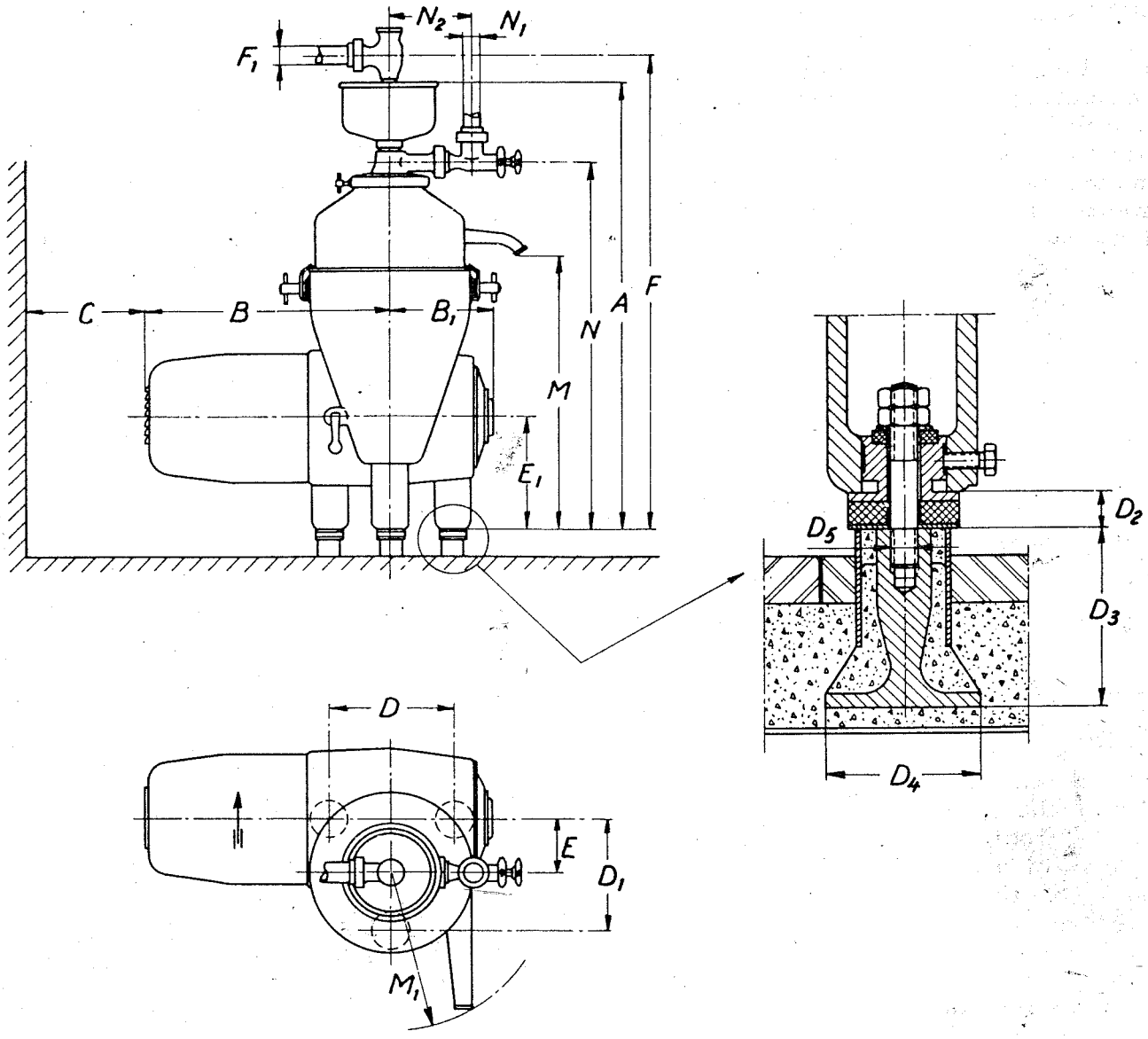
Never use lye for cleaning the bowl casing in the frame, nor flush it out with water. Wipe it with a moistened cloth and dry it.

x) For C-parts see page 9 and 33, for V-parts see page 41.



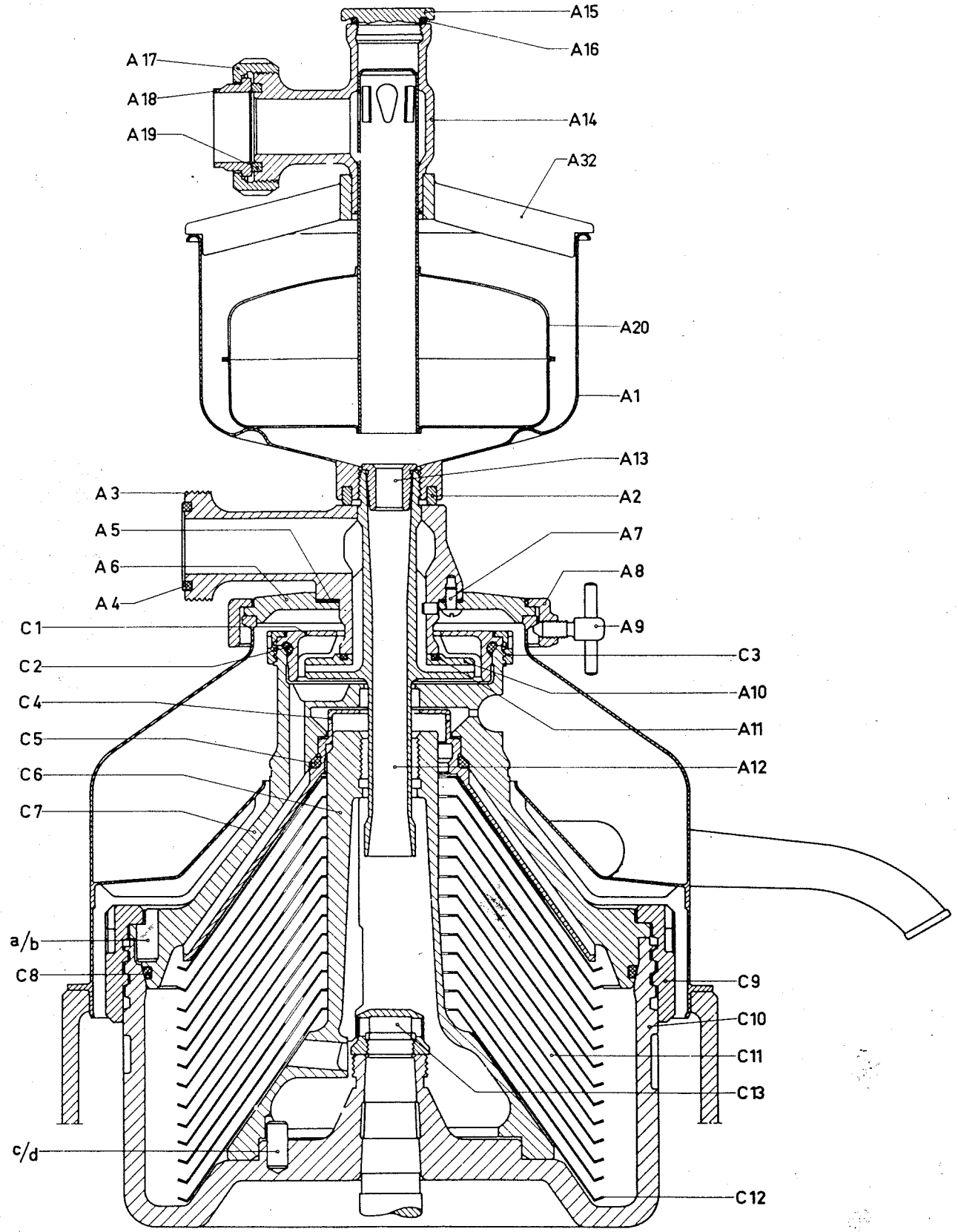
		A	B	D	D_1	D_2	D_3	D_4	D_5	E	E_1
2231T	mm	946	235	270	215	20	100	85	W5/8"	115	250
	inches	37 1/4	9 1/4	10 5/8	8 7/16	13/16	4	3 3/8	W 5/8	4 1/2	9 13/16
		E_2	E_3	E_4	F	F_1	M	M_1	N	N_1	N_2
	mm	410	115	60	1010	38	580	440	770	38	177
	inches	16 1/8	4 1/2	2 3/8	39 3/4	1 1/2	22 13/16	17 5/16	30 5/16	1 1/2	6 15/16

		A	B	D	D_1	D_2	D_3	D_4	D_5	E	E_1
2251T	mm	993	235	270	244	20	100	85	W5/8"	115	250
	inches	39 1/8	9 1/4	10 5/8	9 5/8	13/16	4	3 3/8	W 5/8	4 1/2	9 13/16
		E_2	E_3	E_4	F	F_1	M	M_1	N	N_1	N_2
	mm	410	115	60	1056	38	595	450	816	38	177
	inches	16 1/8	4 1/2	2 3/8	41 9/16	1 1/2	23 7/16	17 3/4	32 1/8	1 1/2	6 15/16



		A	B	B1	C min.	D	D1	D2	D3	D4	D5
2231M	mm	946	520	235	350	270	215	20	100	85	W 5/8"
	inches	37 1/4	20 1/2	9 1/4	13 3/4	10 5/8	8 7/16	13/16	4	3 3/8	W 5/8
		E	E1	F	F1	M	M1	N	N1	N2	
	mm	115	250	1010	38	580	440	770	38	177	
	inches	4 1/2	9 13/16	39 3/4	1 1/2	22 13/16	17 5/16	30 5/16	1 1/2	6 15/16	

		A	E	B1	C min.	D	D1	D2	D3	D4	D5
2251M	mm	993	560	235	392	270	244	20	100	85	W 5/8"
	inches	39 1/8	22 1/16	9 1/4	15 7/16	10 5/8	9 5/8	13/16	4	3 3/8	W 5/8
		E	E1	F	F1	M	M1	N	N1	N2	
	mm	115	250	1056	38	595	450	816	38	177	
	inches	4 1/2	9 13/16	41 9/16	1 1/2	23 7/16	17 3/4	32 1/8	1 1/2	6 15/16	


A15
A16
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A18
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A32
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A1
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A3
A2
A5
A7
A6
A8
A4
C1
A9
C2
C3
C4
A10
C5
A11
C6
A12
C7
a/b
C8
C9
C10
C11
C13
c/d
C12

When several separators of the same type and size are used in a plant, it is essential not to interchange the parts of the different bowls, as each bowl forms a balanced unit. A bowl assembled with parts belonging to other separators will get out of balance, and this causes bad running (vibrations). To avoid confusion the main parts of each bowl are stamped with the same group of figures (the last three digits of the manufacturing number).

A1	Regulating vessel
A2	Seal ring
A3	Outlet piece
A4	Rubber ring
A5	Height adjusting ring
A6	Bottom ring
A7	Screw
A8	Clamping ring
A9	Clamp screw
A10	Top part of paring disc
A11	Rubber ring
A12	Inlet tube
A13	Nozzle
A14	Float housing
A15	Screw plug
A16	Rubber ring
A17	Coupling nut
A18	Connecting sleeve
A19	Rubber ring
A20	Float
A32	Float housing holder

C1	Paring chamber cover
C2	Rubber ring
C3	Lock ring, small
C4	Top disc
C5	Rubber ring (only for type 2251)
C6	Distributor
C7	Bowl hood
C8	Rubber ring
C9	Lock ring, large
C10	Bowl body
C11	Bowl disc
C12	Bottom disc
C13	Cap nut

Wipe the tapering end of the bowl spindle and the corresponding bore in the bowl body C10, so that no impurities could scratch the surfaces when assembling. Any burrs caused by rough handling should be removed with fine emery cloth.

Check that the lock screws B2 are backed off sufficiently. Put the bowl body on the spindle by means of tool V4. Tighten the lock screws into the notches in the bowl body. Screw on cap nut C15 and tighten it with the handle of the screw driver. Place the distributor C6 on the wooden stand and slip the discs over the distributor in numerical sequence, starting with No. 1. Take care not to spin them, to avoid unnecessary damaging of the distributor ribs and the discs.

Place the distributor with discs in the bowl body by means of tool V4. When turning the distributor rib having no guide rail in the same direction as the guide notch "b" in the bowl body, the guide notch "c" of the distributor will register at once with pin "d" of the bowl body.

Put on top disc C4 so that its inner guide fits exactly in the distributor. With type 2251 put rubber ring C5 in its place.

Put rubber ring C8 in the groove of bowl hood C7 and put on the bowl hood so that the guide lug "a" on its flange enters notch "b" in the bowl body.

If the hood does not sink into proper position at once, do not force it down (e.g. by screwing on the lock ring), but examine whether some parts have been wrongly fitted.

Apply castor oil to the contact surfaces between bowl hood and lock ring C9 and to its thread.

Screw on the lock ring and tighten with spanner V6, until marks "f" (page 32) are right in front of each other. When necessary, the last tightening can be done by knocking on the spanner handle with a tin mallet.

Put rubber ring A11 in the groove in the paring disc top part A10 and push the latter on to the inlet tube A12. Insert the inlet tube in the bowl.

Put rubber ring C2 in the groove in paring chamber cover C1 and fit the latter in its place. Observe guide pin "e" (see page 32). Screw on lock ring C3 and tighten with spanner V7.

Back off lock screws B2 3-4 turns so that the bowl can rotate freely.

Put on frame hood B1 and secure it with the two locking arms B3.

Push outlet piece A3 over the inlet tube, put on clamping ring A8 and screw in clamp screws A9 a little, so that bottom ring A6 is held in place. Screw the regulating vessel A1 (left-hand thread) on to the inlet tube. Insert rubber ring A4. Tighten the regulating valve and connect the discharge pipe for skim milk.

Tighten clamp screws and coupling nuts firmly.

1 1/2" 24 mm.

For separation of milk fit nozzle A13, float and float housing holder. Connect the float housing with the feed pipe for whole milk.

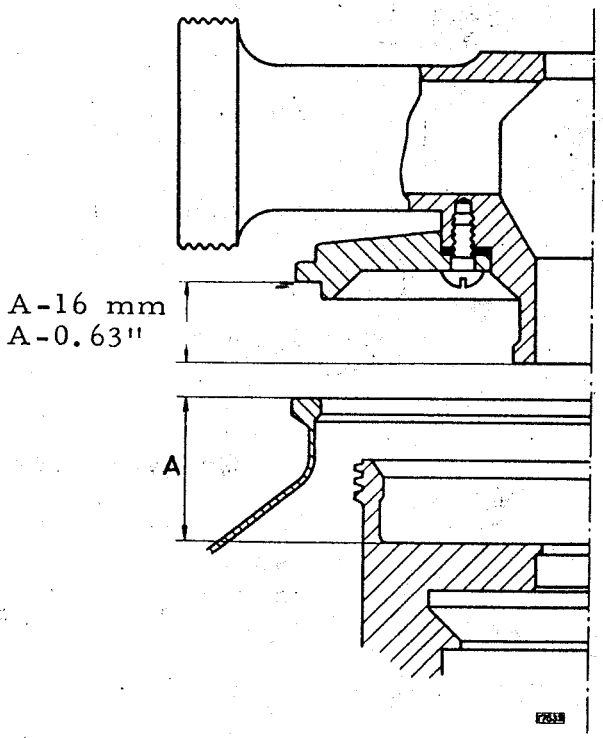
For separation of whey the nozzle A13 should not be fitted, in order that the throughflow can be increased.

The height of the paring disc

is checked as follows:

Measure distance "A" between the contact surface of the frame hood and the paring chamber bottom, and the distance between the contact surface of the bottom ring and the lower edge of the milk outlet piece.

The difference between these measurements should be 0.63" (16 mm). If it is larger or smaller, screw apart bottom ring and milk outlet piece, and remove or add one or more height adjusting rings A5, as required.



LUBRICATION

Use a high grade motor oil SAE 30, "Service ML" (Regular oil) or "Service MM" or "Service MS" (Premium Type), with a viscosity of 58-70 SUS at 210°F, corresponding to 1.81-2.12°E at 99°C. Viscosity index minimum 90.

SAE 30 SAE 40 OIL

Before the first starting

screw out screw plug B5 (page 28) and fill oil about 0.37 Imp.gals. (1.7 lit.) into the worm gear housing, until the oil level reaches the middle of oil gauge glass BE16.

Always when assembling the bowl

apply castor oil to the threads and the contact surfaces of the lock rings and to the corresponding surfaces on bowl hood and paring chamber cover.

Always when removing the bowl body from the bowl spindle

wipe the conical spindle end clean and lubricate it afterwards.

Always before starting

check that the oil level reaches the middle of the oil gauge glass. Keep he glass clean. In time, deposits will form a line on the inside of the glass, which could be mistaken for the oil level.

From time to time

back off the drain screw B7 some turns and drain off any condensation water in the oil bath.

Oil change

should take place the first time after about 300 working hours and then after each operating period of ca. 800 hours.

Drain off the old oil as soon as the bowl has come to rest, while the oil is still warm and before impurities have had time to settle. Wipe the worm gear housing and worm gear with a smooth cloth. Pour in fresh oil and check that the packings B8 for the oil drain screw and BE2 (page 30) for the cover BE1 are free from defects and seal tightly.

SEPARATION

Assemble the bowl as well as inlet and outlet parts as described on pages 9 and 10.

Check:

that the brake is released

that the frame hood is firmly locked with the locking arms - see B2b in illustration on page 28

that the worm gear housing contains enough oil.

Start the separator.

The speed (see page 1) is read on tachometer BE4 and checked by means of the revolution counter. Press a finger against the latter and count its strokes per minute.

Heat is always generated in the friction coupling during the running-up period, and often also smoke appears. This is quite normal. When the bowl is up to speed, turn on the milk. Regulation of the cream is effected by means of the regulating valve, which is located in the skim milk outlet. After separation flush bowl and pipes with water.

Stop the separator. Apply the brake. Release it again when the bowl has stopped. Never dismantle the separator until the bowl is at rest.

SAMPLING

If a skim milk analysis shows a result below standard, this is not necessarily due to the separator. It may as well be that the sample has been drawn wrongly or the analysis has not been made correctly. Before reporting to us, ascertain by renewed sampling that the skim milk sample has been drawn correctly and under normal operating conditions.

The sample should be drawn from the pipe next to the separator. Samples taken simultaneously at the separator and for instance from the skim milk tank may show different fat contents, by way of example because a cock in a connection pipe between the skim milk and whole milk sections of the plate heat exchanger leaks.

The fat is contained in the milk in the form of small globules with diameters varying between 0.01 and 0.0001 mm. The machine can normally separate off all globules with exception of the smallest ones, i.e. those having diameters between 0.001 and 0.0001 mm. These globules mostly remain in the skim milk - the clean-skimming thus depends on the percentage of such small globules contained in the whole milk.

In this respect milk from different breeds of cow can vary. Besides, the number of small fat globules increases towards the end of the lactation period and when changing from stall feeding to pasturage. The skimming result thus varies, for natural reasons with breed of cow and season.

Return milk, butter milk and cream are especially difficult to separate and should not be mixed with the whole milk before clean-skimming samples are taken.

If the milk is exposed to unsuitable treatment, the larger fat globules could be split up, so that the number of small globules increases.

TROUBLE TRACING

A. Skimming result below standard

Cause of trouble	Remedy
1. Unsuitable milk pump	A modern centrifugal pump normally has no unfavourable influence on the milk. If the feed pipe is not sufficiently dimensioned or is throttled in some way or other a vacuum may be formed or air be sucked into the pump, which would have a splitting effect on the fat globules in the milk. Therefore, do not attempt any regulation of the throughput in the feed pipe of the pump.

Cause of trouble	Remedy
2. The pasteurizer or the preheater is defective, so that steam leaks into the milk	Heating by direct injection of steam in the milk should be avoided
3. The temperature of the milk is too low	The temperature should be at least 104°F (40°C)
4. The milk is sourish	
5. Skim milk leaks from the paring chamber into the cream cover, because rubber ring C2 does not seal. As a consequence, the cream is diluted and the regulating valve must be readjusted to obtain a mixture with the fat content desired. It can now occur that the cream in the bowl becomes so thick that a cream blockage is caused in the disc set, and this reduces the skimming efficiency	To check if the rubber ring seals, run the bowl without inlet tube and feed water to the bowl. It can now be seen or felt with the hand whether water leaks out at lock ring C3. However, the skimming efficiency will not be affected, unless the quantity of skim milk leaking out is rather large
6. The throughflow is too large	See page 4
7. The separator bowl rotates too slowly. The cause may be:	See page 4
that the pads of friction blocks are oily or greasy	Clean the friction pads and the friction surface of the conveyor pulley with a fat solvent. Roughen up the pads with a coarse file
that the friction pads are worn	Renew the pads (see page 23 and 25)
that the electrical equipment has become defective	
that the belt slips (T-drive)	
8. The bowl is clogged	Clean the bowl before the sludge layer has reached the set of discs
9. The bowl discs are badly cleaned, or deformed	See page 16

B. Unsatisfactory cream thickness

Cause of trouble	Remedy
1. Skim milk leaks into the cream cover	See above under A. 5
2. The back pressure in the skim milk outlet is too high	Thick cream can be obtained only when the total resistance in regulating valve and discharge pipe does not exceed 35.6 lbs/sq.in. (2.5 kg/cm^2) for type 2231, and 42.7 lbs/sq.in. (3.0 kg/cm^2) for type 2251 respectively. For separation of whey at increased throughflow the corresponding highest permissible back pressure is 24.2 lbs/sq.in. (1.7 kg/cm^2), and 31.3 lbs/sq.in. (2.2 kg/cm^2) respectively.
3. The paring disc or its top part is deformed	

C. The separator runs badly

Cause of trouble	Remedy
1. The separator is not lined up exactly or stands unsteady	See page 5
2. The bowl is wrongly assembled	Marks "f" (see page 32) on lock ring and bowl hood should be right in front of each other
3. The pressure in the disc set has become insufficient	In time, the pressure in the disc set of a tightened bowl can decrease, so that the single bowl discs are unsteady, even though the mark "f" of the lock ring is in line with the corresponding mark on the bowl hood. To check this, assemble and tighten the bowl without inserting the rubber ring. If the lock ring can now be easily tightened by means of the spanner till the marks "f" line up, put in the extra bowl disc (without number).

Cause of trouble	Remedy
4. A ball bearing is damaged	If a high "grinding" sound is heard from a bearing, renew this bearing at once
5. A top bearing spring is damaged	Renew the spring
6. The worm wheel is damaged or worn	Exchange the worm wheel. As a rule the worm should be renewed at the same time
7. The separator bowl is damaged	Send in the complete bowl for repair

CLEANING AFTER SEPARATION

After each separation all parts in contact with milk must be dismantled and cleaned immediately.

Remove float housing and float. Unscrew the regulating vessel. Remove the regulating valve.

Back off the clamp screws and remove outlet piece and clamping ring. Loosen the locking arms and take off the frame hood.

Unscrew the small lock ring (with spanner V7) and take out inlet tube and paring chamber cover.

Empty the bowl as far as possible with siphon V5. Unscrew the large lock ring with spanner V6. Lift off the bowl hood and top disc.

Screw lifting tool V4 into the distributor, which is then lifted out together with the disc set and placed on a wooden stand.

Remove the rest of the liquid.

Unscrew the cap nut with screw driver V15. Lift out the bowl body with tool V4.

Take apart the regulating valve and float housing. Wash all parts in hot water, to which some soda has been added, and rinse them in clean, hot water. Hang the discs spaced from each other on the disc drier. Rinse the rubber rings in warm water and keep them flat. Keep the parts in a dry, warm place till the separator is to be used again.

Neither use lye for cleaning the bowl casing in the frame, nor flush it out with water. Wipe it with a moistened cloth. Check that the waste milk tube is always open and clean.

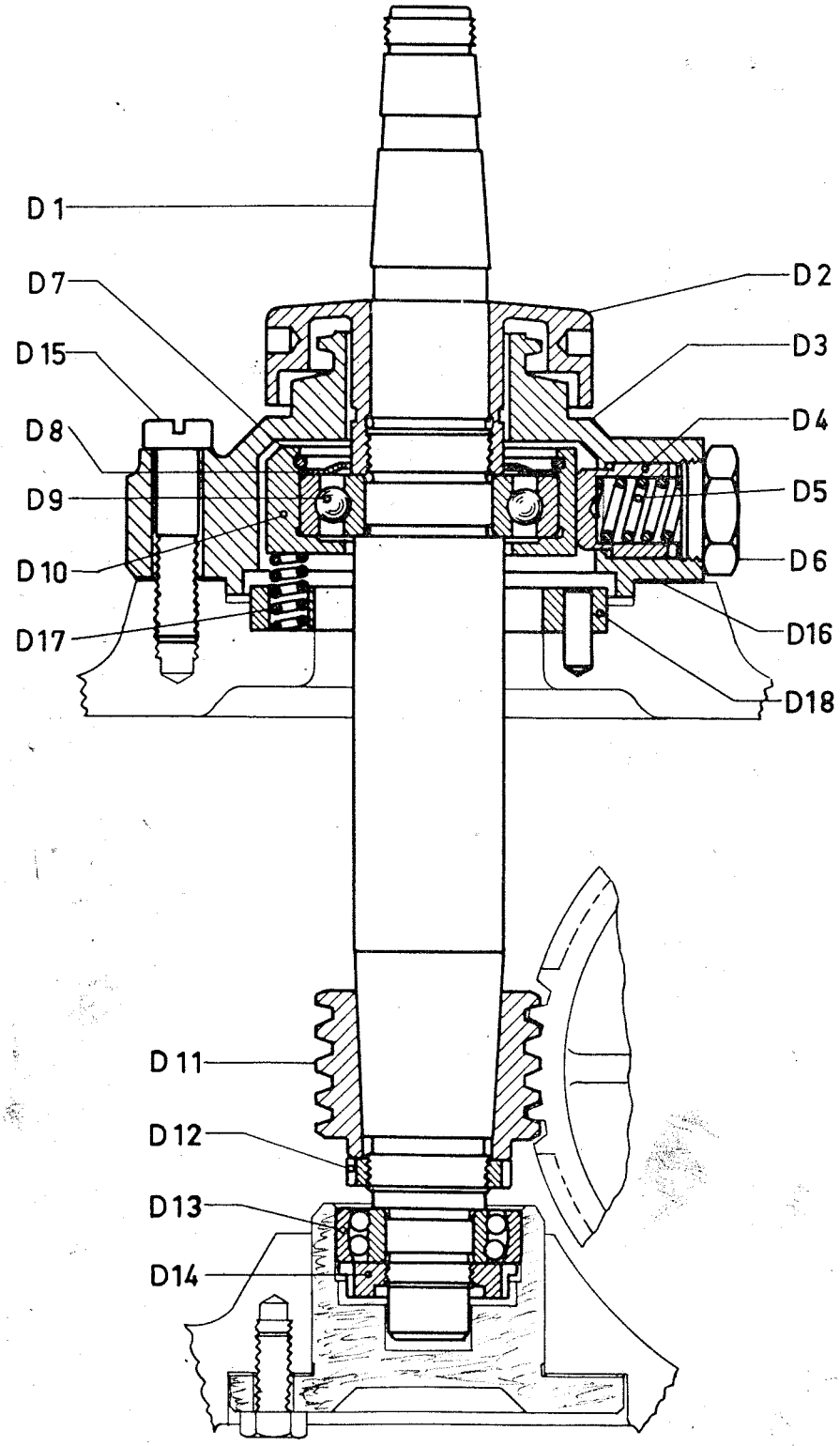
PERIODIC CLEANING

In addition to daily maintenance, the separator should be carefully inspected and cleaned once a year. Check especially that ball bearings, top bearing springs, brake lining and friction block pads are in good condition. Renew worn parts.

Do not remove new bearings from their wrappers until ready to fit. New bearings are coated with grease. Leave the grease untouched.

Ball bearings should never be forced on to a shaft by blows applied to the outer race, nor into a housing by pounding upon the inner race. When a bearing is expanded by being heated in oil, the temperature of the oil should not exceed 180°F (80°C) and the bearing should not be kept in the bath longer than necessary to bring the entire bearing to the required temperature.

When bearings after some length of time have been removed, they should be thoroughly washed in clean kerosene and reoiled before mounting.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D 14

Separator bowl

The main parts of the bowl can be exchanged only in our workshops, as the bowl must be rebalanced afterwards. However, top disc, single bowl discs and the rubber rings can be renewed on the spot without subsequent rebalancing.

In case of emergency the customer can exchange the whole set of discs and even the distributor at his own risk. If this is done, however, the bowl balance must be carefully checked afterwards.

Vertical driving device

Remove cover BE1 (see page 20). Apply the brake. Back off screws E5 (see page 22) with socket wrench V10 until clamping ring E6 comes loose from the worm wheel and draw out the latter towards ball bearing E4.

Back off the six screw plugs D6.

D1 Bowl spindle
D2 Lock nut
D3 Spring casing
D4 Buffer
D5 Spring
D6 Screw plug
D7 Elastic ring
D8 Protective washer
D9 Ball bearing
D10 Ball bearing bushing
D11 Worm
D12 Round nut
D13 Ball bearing
D14 Lock nut
D15 Screw for spring casing
D16 Packing
D17 Supporting spring
D18 Guide ring for supporting spring

Screw out the three screws D15 and lift the bowl spindle and top bearing straight upwards from the frame. To secure a better hold on the spindle, the cap nut can be screwed on. Take out the six supporting springs lying in guide ring D18.

Clamp the spindle in a screw vice provided with soft linings and unscrew the left-hand threaded lock nut D2. Back off the screw plugs and remove springs and buffers. Remove the spring casing.

Remove the elastic ring for the bearing and the protective washer, and pull off the bearing bushing. The bearing should not be removed from the spindle unless it is to be exchanged.

Unscrew lock nut D14 with hook spanner V8 and pull out ball bearing D13.

Unscrew round nut D12 with the same spanner and pull out worm D11.

Clean all parts in kerosene and lubricate them afterwards.

The assembling is done in reverse order.

Before inserting the spindle in the frame make sure that bushing B9 (page 28) is clean on the inside and that packing D16 has no defects.

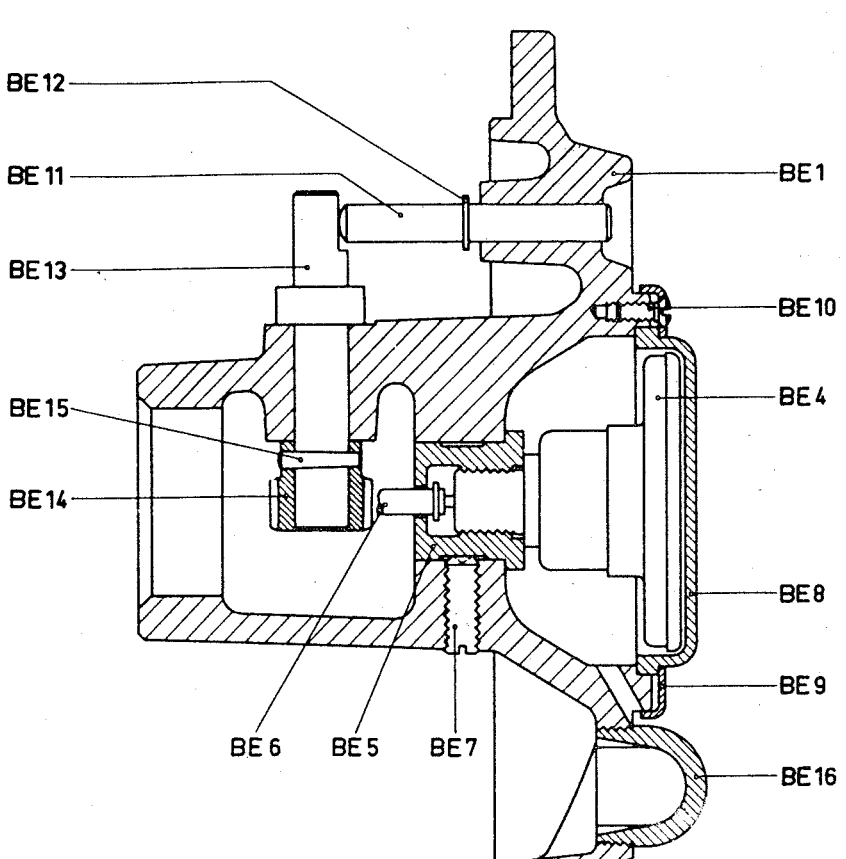
With the spindle fitted in the frame and the top bearing mounted check:

that the screw plugs D6 are firmly tightened

that the bowl spindle rotates freely.

Mounting of cover BE1 - see page 21.

If bushing B9 should be removed, screw out the four screws B11. When assembling check that packing B10 has no defects and seals tightly.


BE 12
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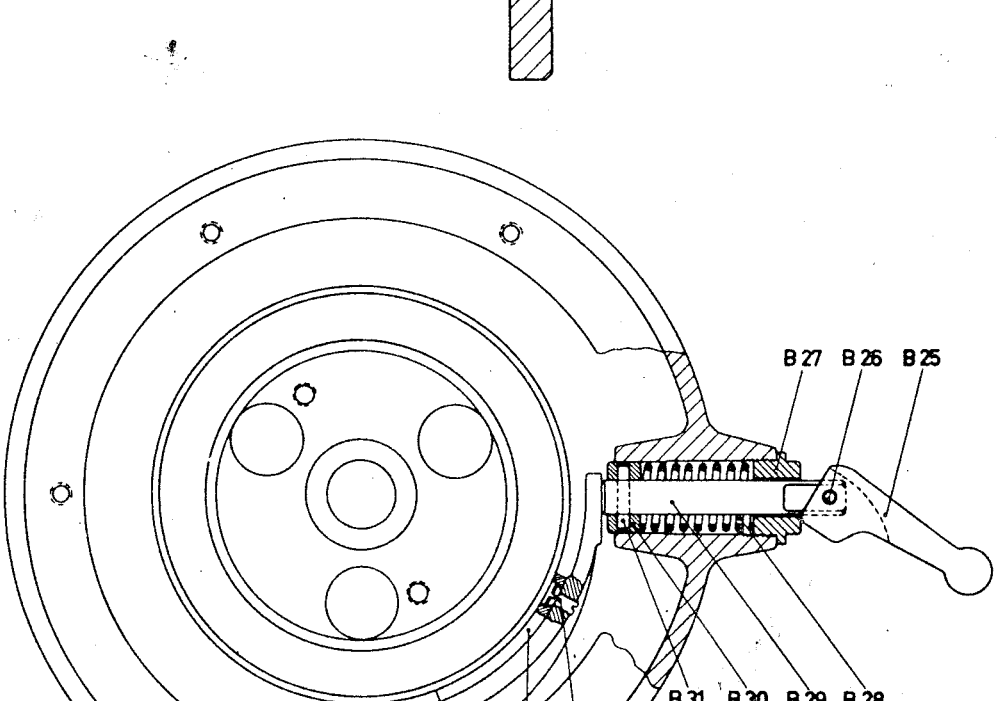
BE 5
BE 7


B 27
B 26
B 25
B 31
B 30
B 29
B 28
B 36
B 35
B 32
B 33
B 34

Cover BE1, tachometer BE4, revolution counter BE11 and oil gauge glass BE16

Back off oil drain screw B7 some turns with spanner V16 and let the oil in worm gear housing run off.

Unscrew the screws holding the cover and lift off the latter.

Screw out screws BE10 and remove fixing ring BE9 and transparent cap BE8.

Unscrew the tachometer.

Bushing BE5 is placed so as to hold the tachometer in a position where it can be easily read. The bushing need normally not be readjusted unless, perhaps, when a new tachometer is fitted.

Remove snap ring BE12 and pull out the revolution counter.

Knock out pin BE15, pull off worm gear BE14 and draw out shaft BE13.

The oil gauge glass is screwed into the cover and has spanner slots provided in its inside for this purpose. In case of renewal, the thread of the new glass should be coated with plastic cement before screwing it in.

The cover and its parts are assembled in reverse order. When mounting the cover on the frame, the driver pin of the intermediate shaft BE6 should be fitted into the slot in the worm gear E1 with the greatest care. The fitting could possibly be facilitated by screwing in the tachometer afterwards.

Before mounting the cover make sure that the packing between cover and frame has no defects and seals tightly.

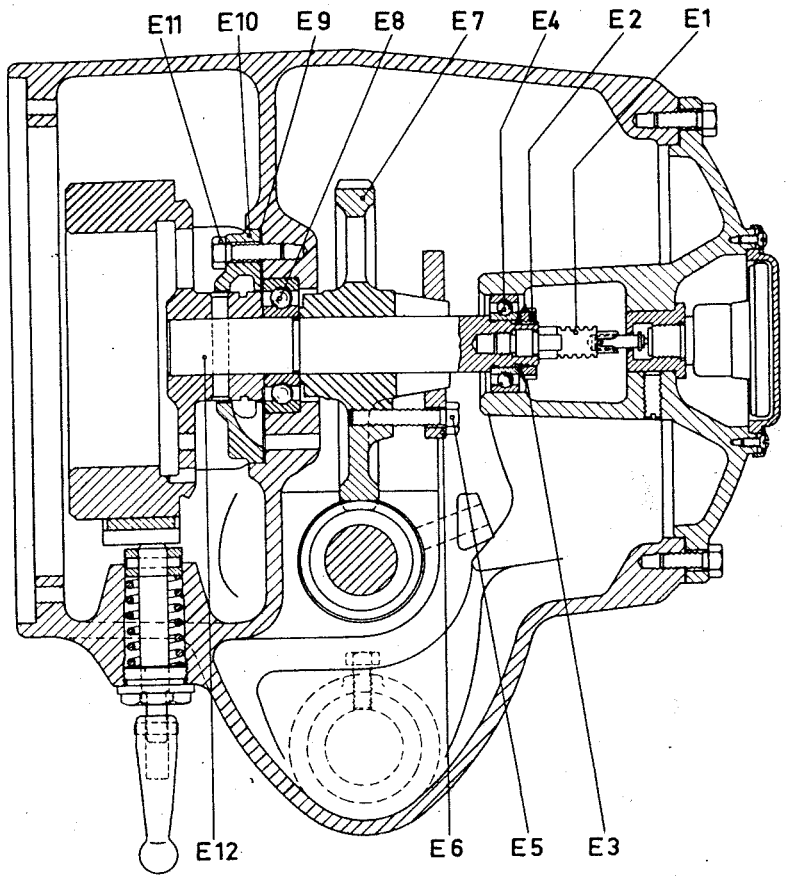
BE1	Cover for worm gear housing
BE4	Tachometer
BE5	Bushing for tachometer
BE6	Intermediate shaft for tachometer
BE7	Set screw for bushing
BE8	Transparent cap for tachometer
BE9	Fixing ring for tachometer
BE10	Screw for fixing ring
BE11	Revolution counter
BE12	Snap ring
BE13	Shaft
BE14	Worm gear
BE15	Pin
BE16	Oil gauge glass
B25	Handle for brake
B26	Slotted pin
B27	Guide plug
B28	Spring
B29	Brake spindle
B30	Stop ring
B31	Pin
B32	Brake shoe
B33	Lining
B34	Screw for lining
B35	Washer
B36	Split pin

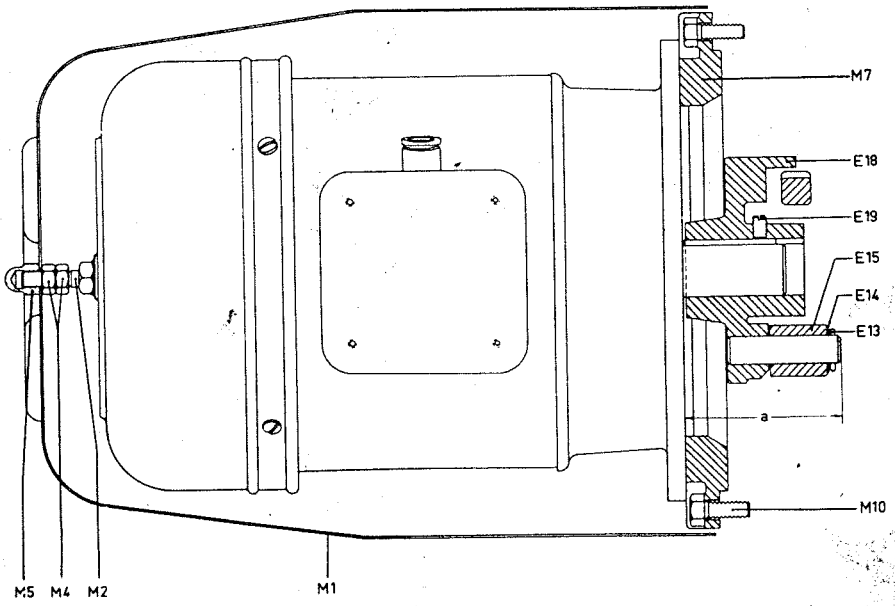
Brake

Unscrew guide plug B27 and draw out the operating means. The latter can be disassembled after the slotted pin B26 has been driven out.

Remove split pin B36 and take off brake shoe B32.

Clean lining B33 in a fat solvent. Exchange it when worn.


E11
E10
E9
E8
E7
E4
E2
E1
E12
E6
E5
E3


M7
E18
E19
E15
E14
E13
a
M10
M5
M4
M2
M1

HORIZONTAL DRIVING DEVICE

Back off oil drain screw B7 some turns and let the oil run off. Apply the brake. Remove the motor and, with "T"-drive, the end shield T1 respectively, as well as the cover BE1. Unbend the lap of lock washer E3 and unscrew round nut E2 with pin spanner V12. Draw off ball bearing E4. Back off screws E5 with socket wrench V10, until clamping ring E6 comes loose from worm wheel E7. Draw the latter off the worm wheel shaft. If the worm wheel is worn, check also worm D11. As a rule, both parts should be exchanged at the same time.

Screw out screws E11 of protecting cover E10 by means of socket wrench V10, which should be put through one of the holes in the conveyor pulley.

Release the brake and draw out the worm wheel shaft with conveyor pulley, protecting cover, and ball bearing E8. If the ball bearing should be exchanged, detach it from the shaft by means of jack screws V11, tightening the latter into the threaded holes of the conveyor pulley against the protecting cover until the bearing is forced loose. Heat the new bearing in oil to 70-80°C (160-180°F) and push it on to the shaft until it rests against the conveyor pulley.

Clean the parts in kerosene and grease them.

After assembling remember to pour fresh oil into the worm gear housing.

E1 Worm gear for revolution counter
E2 Round nut for ball bearing
E3 Lock washer
E4 Ball bearing, loose
E5 Screw for clamping ring
E6 Clamping ring
E7 Worm wheel
E8 Ball bearing, fixed
E9 Packing
E10 Protecting cover
E11 Screw for protecting cover
E12 Worm wheel shaft with conveyor pulley
E13 Split pin
E14 Washer
E15 Friction blocks
E18 Coupling pulley
E19 Set screw

M1 Protecting hood
M2 Screw
M4 Nut
M5 Cap nut
M7 Motor adapter
M10 Screw

MOTOR x), COUPLING - "M"-DRIVE

Unscrew cap nut M5 and remove the protecting hood and the seal strip.

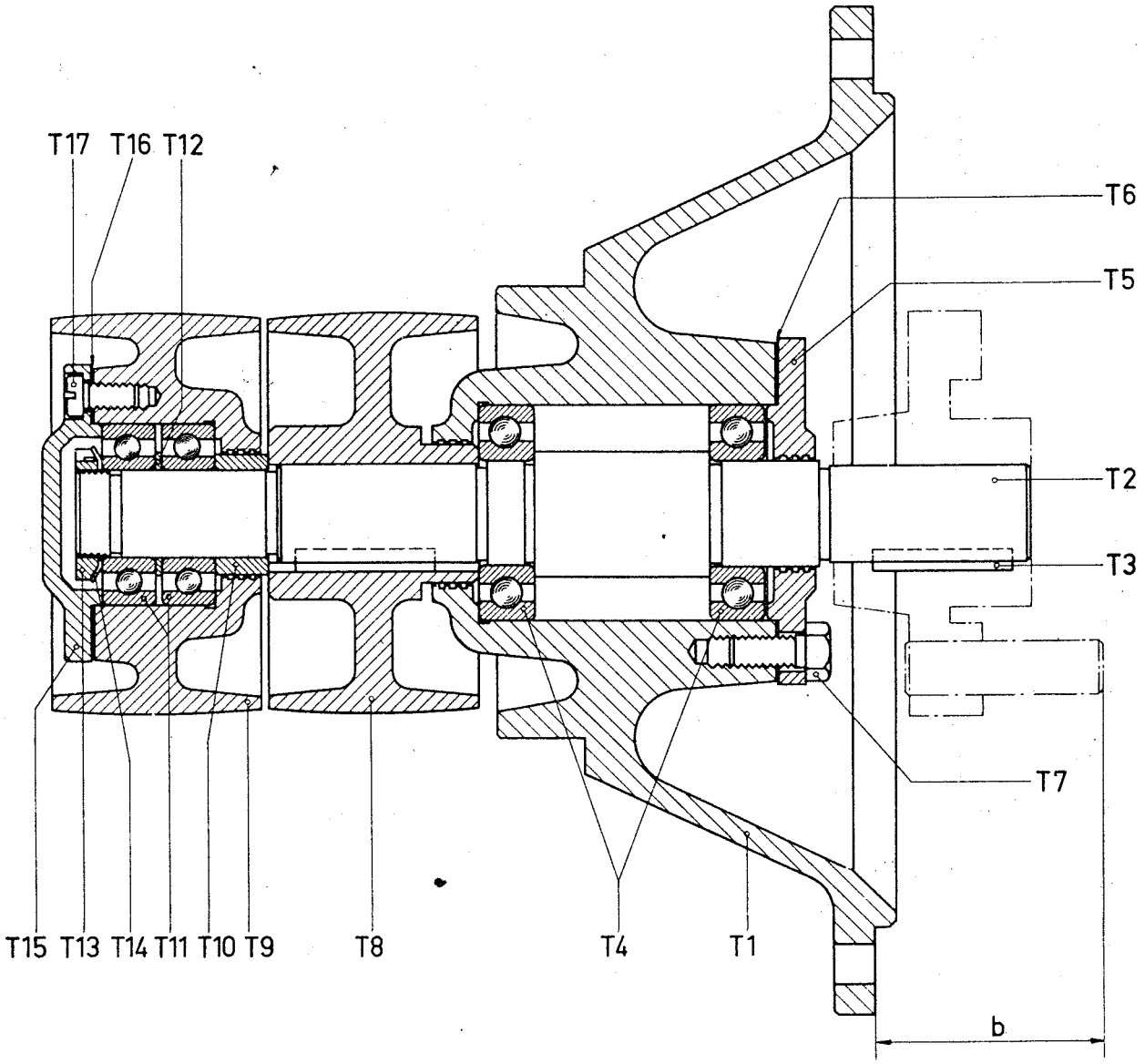
Before removing the motor, the cable must be disconnected. Leave this job to an electrician.

Screw out the six screws M10 and lift off the motor with adapter and coupling pulley.

Clean the pads of the friction blocks and the friction surface of the conveyor pulley with a fat solvent. Renew the pads if they are worn.

If the coupling pulley has been removed from the motor shaft, mount it again so that the distance "a" between the machined contact surface of the motor and the outer end of the pins of the coupling pulley is 3 1/2" (89 mm).

x) The directions for dismounting of the motor are intended for motor AEG KOM 53e-4 and KOM 53g-4.


T17
T16
T12
T6
T5
T2
T3
T7
T15
T13
T14
T11
T10
T9
T8
T4
T1
b

BELT GEARING, COUPLING - "T"-DRIVE

Remove the belt. Screw out screws T17 and remove protecting cover T15 and packing T16.

Unbend the lap of lock washer T14 and unscrew round nut T13 with spanner V12. Draw off the loose belt pulley T9.

Take out ball bearing T11, spacing washer T12 and spacing sleeve T10. Clean nave and parts in kerosene. Lubricate the ball bearings and fill the nave to one third with ball bearing grease.

When assembling, remember to lock the round nut with the lock washer.

The holder for the belt shifter - see parts list - can be removed after backing off screw T24.

END SHIELD

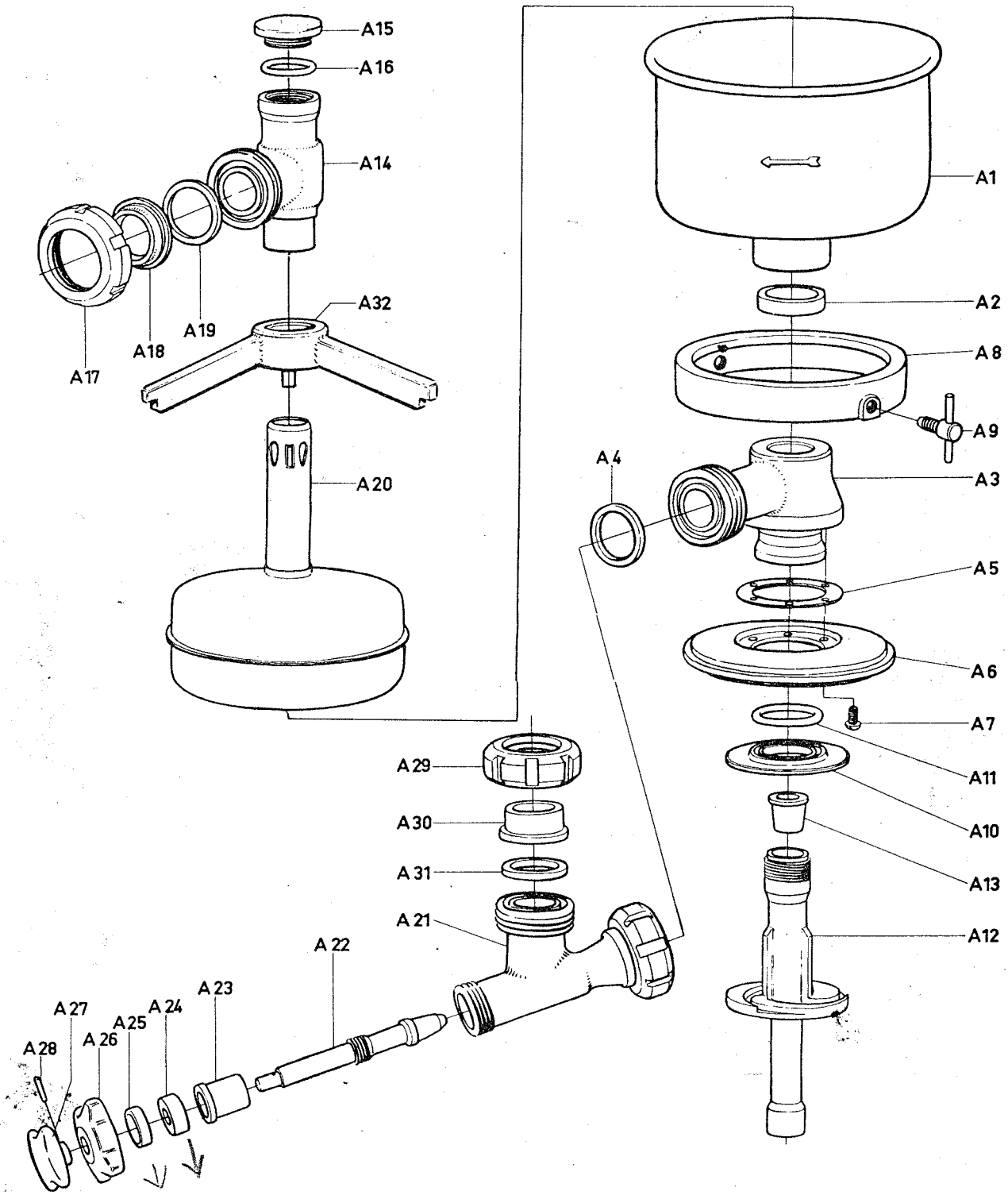
Screw out screws T18 with socket wrench V10 and remove end shield T1.

Back off set screw E19 - see parts list - and draw out coupling pulley E18. Screw out screws T7 and remove protecting cover T5. Pull out shaft T2 with ball bearings T4. Clean nave and parts with kerosene. Lubricate the ball bearings and fill the nave to one third with ball bearing grease.

Clean the pads of the friction blocks and the friction surface of the conveyor pulley with a fat solvent. Renew the pads when they are worn.

The coupling pulley must be placed on the shaft so that the distance "b" between the machined contact surface of the flange and the outer end of the pins of the coupling pulley is 2 51/64" (71 mm).

T1	End shield
T2	Shaft
T3	Flat key
T4	Ball bearings
T5	Protecting cover
T6	Packing
T7	Screw
T8	Fast belt pulley
T9	Loose belt pulley
T10	Spacing sleeve
T11	Ball bearings
T12	Spacing washer
T13	Round nut
T14	Lock washer
T15	Protecting cover
T16	Packing
T17	Screw


A15
A16
A14
A32
A19
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A20
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A31
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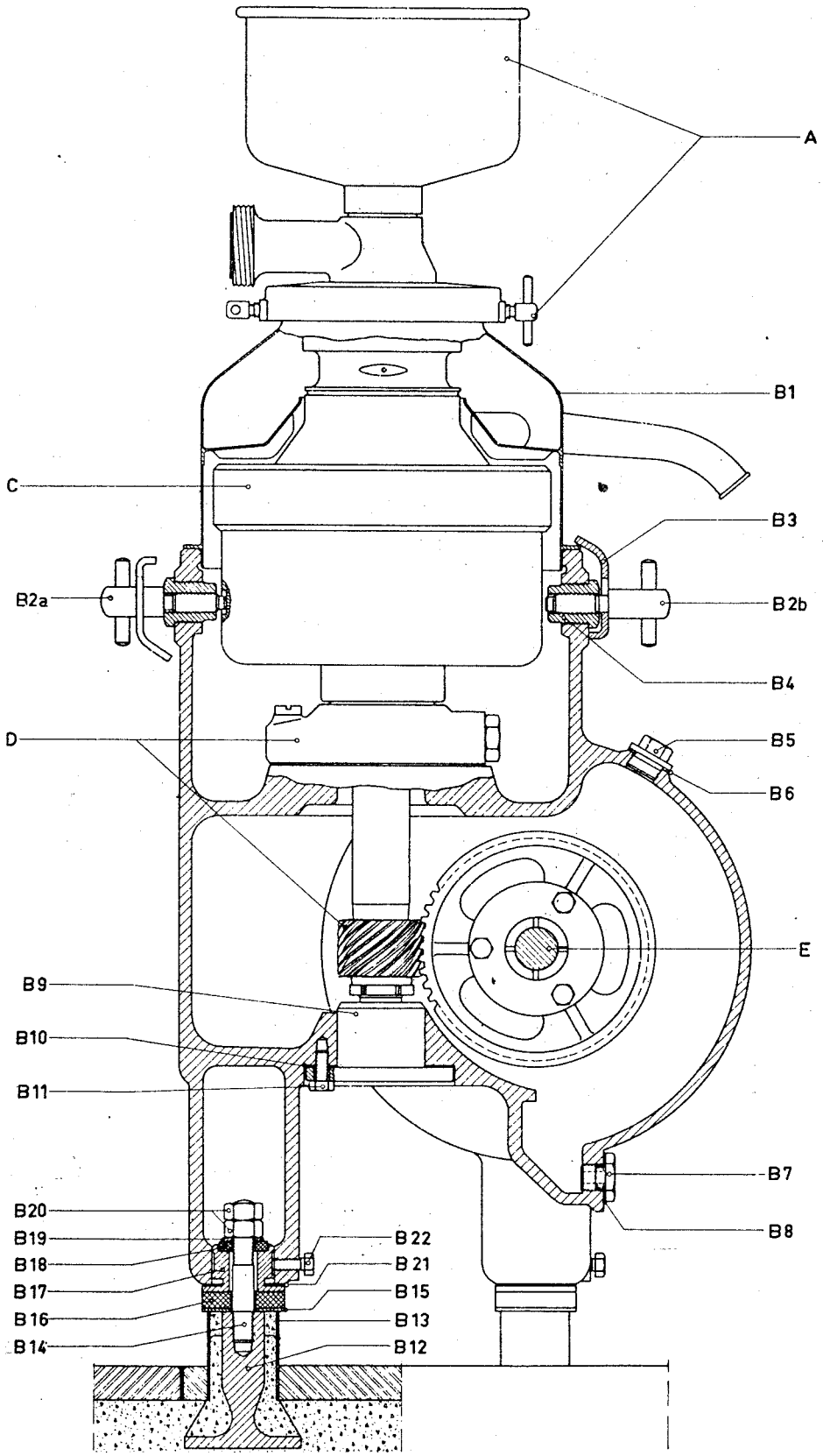
A22
A23
A24
A25
A26
A27
A28

Lettering	Part number 2231M&T	Part number 2251M&T	Quantity	
A1-2	43271x	43274x	1	Regulating vessel
A2	43193x	43193x	1	Seal ring
A3	43280x	43388x	1	Outlet piece
A4	190603	190603	1	Rubber ring
A5	43026	43026	1-3	Height adjusting ring
A6	43283x	43283x	1	Bottom ring
A7	68678	68678	6	Screw
A8	43284x	43284x	1	Clamping ring
A9	43285x	43285x	2	Clamp screw
A10	43279x	43387x	1	Top part of paring disc
A11	10606	10485	1	Rubber ring
A12	43314x	43318x	1	Inlet tube with paring disc
A13	43315x	43386x	1	Nozzle
A14-20	43270x	43270x		High pressure float
A14	43263x	43263x	1	Float housing
A15	43268x	43268x	1	Screw plug
A16	9169	9169	1	Rubber ring
A17	190622	190622	1	Coupling nut
A18	190636	190636	1	Connecting sleeve
A19	190603	190603	1	Rubber ring
A20	43264x	43264x	1	Float
A21-31	11997	11997		Regulating valve
A21	11998	11998	1	Valve housing with coupling nut
A22-28	12000	12000		Valve spindle, complete
A22	43001	43001	1	Valve spindle
A23	43002	43002	1	Threaded sleeve
A24	43003	43003	1	Packing
A25	43004	43004	1	Gland
A26	43005	43005	1	Packing nut
A27	11701	11701	1	Hand wheel
A28	43033	43033	1	Split pin
A29	190615	190615	1	Coupling nut
A30	190629	190629	1	Connecting sleeve
A31	190603	190603	1	Rubber ring
A32	785179-80	785179-80	1	Float housing holder

A-22 1
A-23. 1
A-24 4
A-21 2


A
B1
C
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B2a
B2b
B4
D
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E
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B11
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B20
B19
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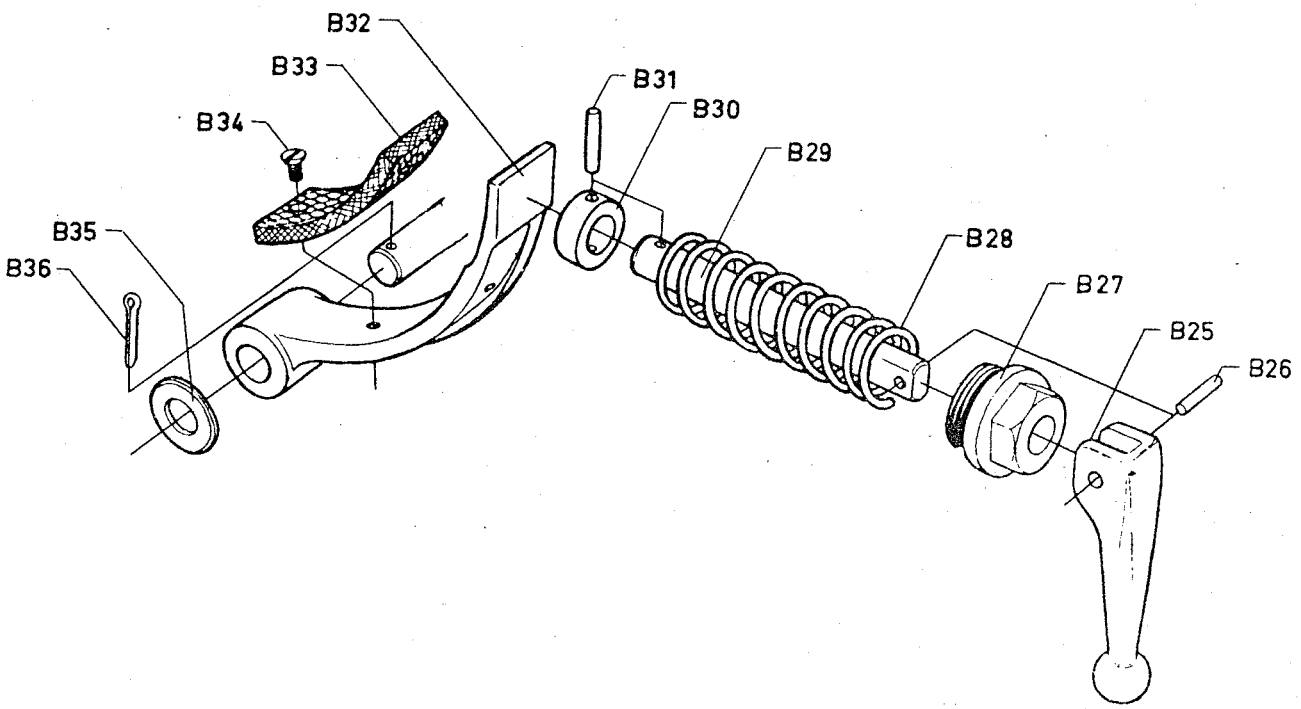
B17
B16
B14
B22
B21
B15
B13
B12

Lettering	Part number 2231M&T	Part number 2251M&T	Quantity	
B1	43287 x	43349 x	1	Frame hood
B2 (a; b)	43359 x	43359 x	2	Lock screw for B1
B3	43362 x	43362 x	2	Locking arm
B4	43363 x	43364 x	2	Bushing for B2
B5	65293	65293	1	Plug for oil filling hole
B6	33787	33787	1	Packing for B5
B7	11494	11494	1	Oil drain screw
B8	35002	35002	1	Packing for B7
B9	43341 x	43341 x	1	Bottom bearing housing
B10	43342 x	43342 x	1	Packing for B9
B11	38544	38544	4	Screw for B9
B12	11662	11662	3	Anchoring foot
B13	11664	11664	3	Sleeve
B14	43131 x	43131 x	3	Stud bolt
B15	11665	11665	3	Washer
B16	11667	11667	3	Rubber cushion, large
B17	43412 x	43412 x	3	Guide sleeve
B18	11668	11668	3	Rubber cushion, small
B19	70490	70490	3	Washer
B20	70493	70493	6	Nut
B21	43413 x	43413 x	6	Adjusting washer
B22	66386	66386	3	Screw

A1-32	Inlet and outlet parts	see page 27
B25-36	Brake	" " 31
BE1-16	Cover for worm gear housing	" " 31
C1-13	Separator bowl	" " 33
D1-18	Vertical driving device	" " 35
E1-19	Horizontal driving device	" " 37
M1-10	Motor adapter, "M"-drive	" " 39
T1-24	Belt gearing, "T"-drive	" " 39


B32
B33
B34
B35
B36
B31
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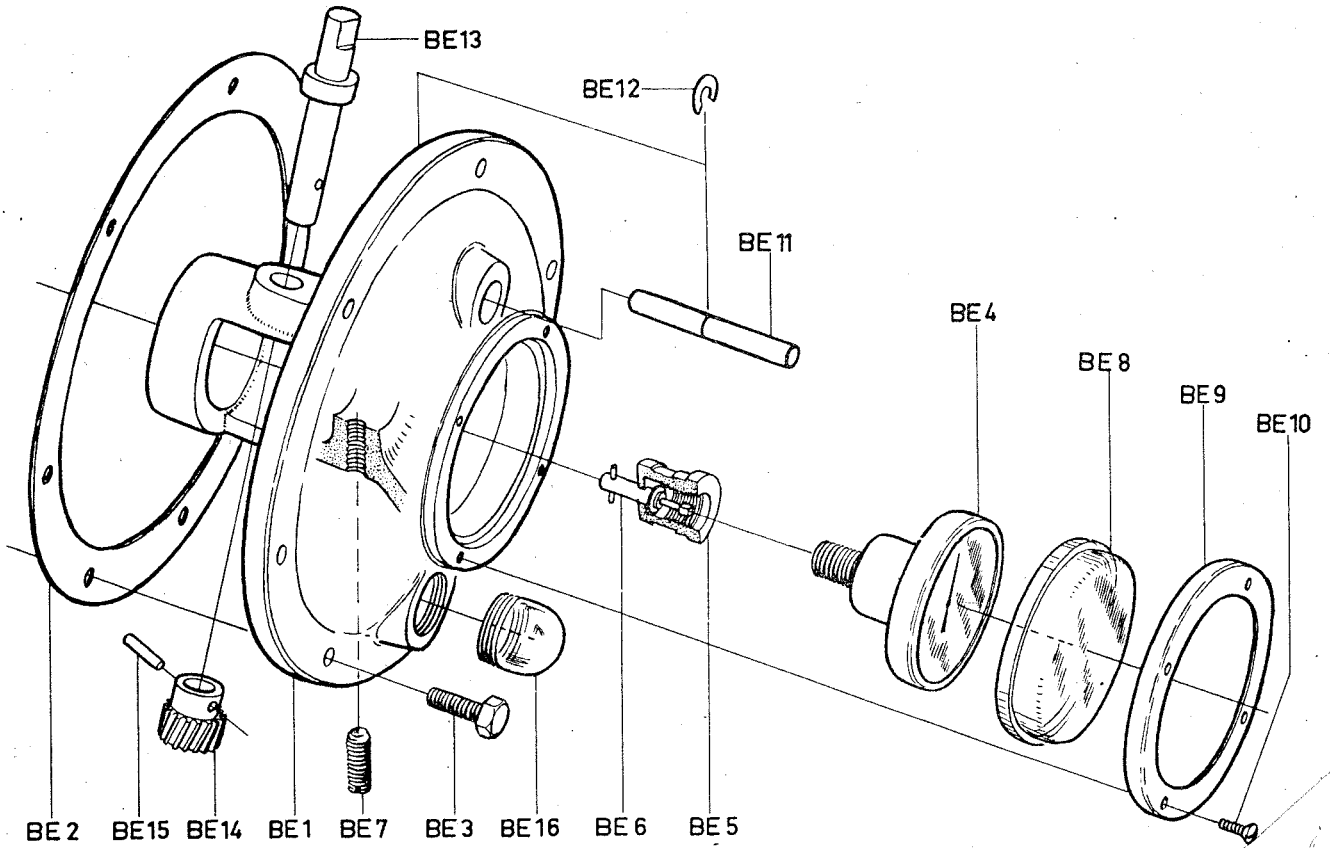
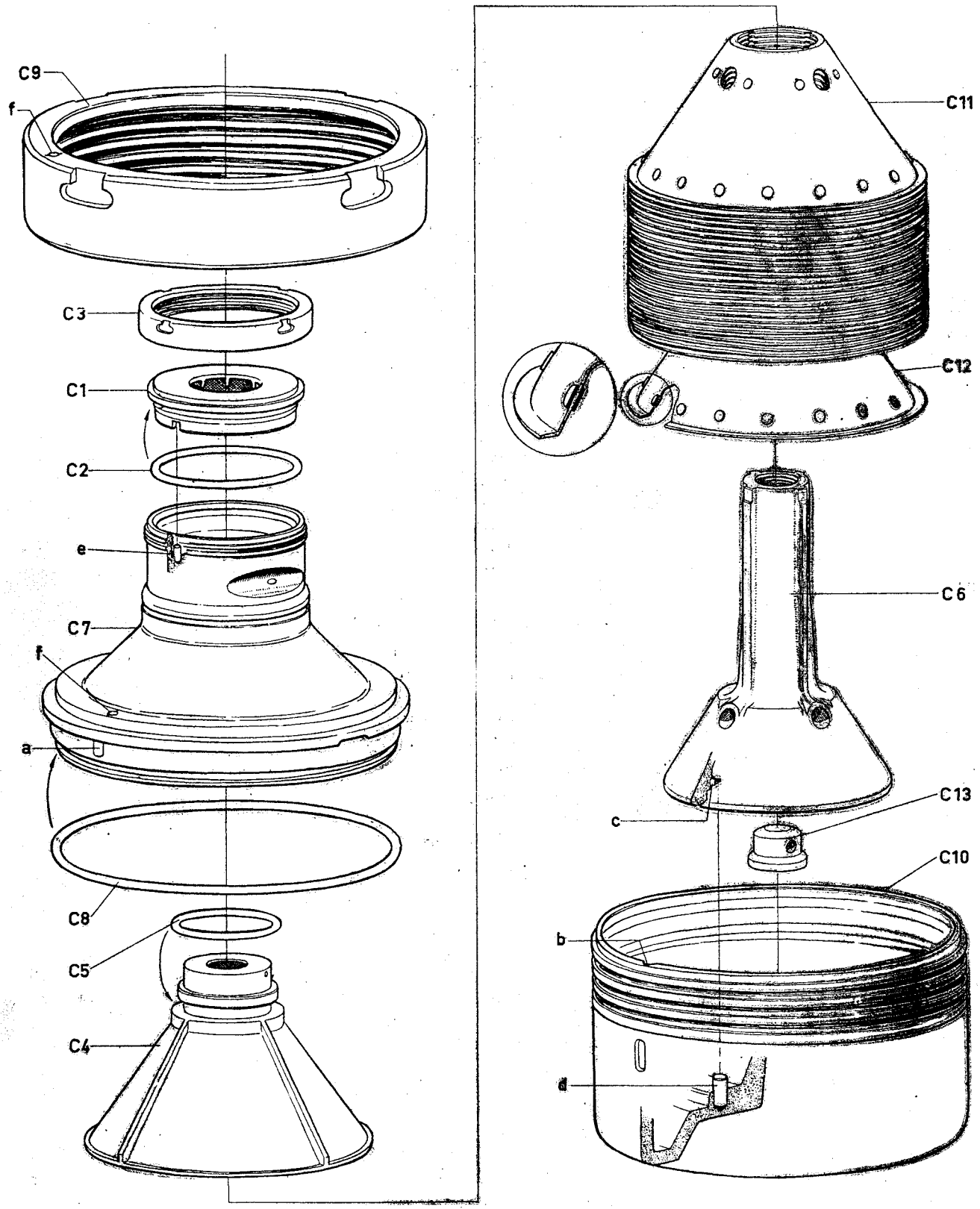
B29
B28
B27
B25
B26


BE13
BE12
BE11
BE4
BE8
BE9
BE10
BE2
BE15
BE14
BE1
BE7
BE3
BE16
BE6
BE5

Letter-ing	Part number	Quan-tity	
B25-31	43356 x		Operating means for brake
B25	43358 x	1	Handle
B26	68794	1	Slotted pin
B27	11503	1	Guide plug
B28	36543	1	Spring
B29	43357 x	1	Brake spindle
B30	11501	1	Stop ring
B31	11502	1	Pin
B32-34	43352 x		Brake shoe, complete
B32	43355 x	1	Brake shoe
B33-34	66548	1	Lining with screws
B34	8341	2	Screw
B35	8115	1	Washer
B36	8114	1	Split pin
BE1	43278 x	1	Cover for worm gear housing
BE2	43354 x	1	Packing
BE3	38544	7	Screw
BE4	43088	1	Tachometer
BE5	43353 x	1	Bushing
BE6	43089	1	Intermediate shaft
BE7	60369	1	Set screw
BE8	43094	1	Transparent cap
BE9	43105	1	Fixing ring
BE10	11565	4	Screw
BE11	43351 x	1	Revolution counter
BE12	43083	1	Snap ring
BE13	43317 x	1	Shaft
BE14	11553	1	Worm gear with pin
BE15	63796	1	Pin
BE16	11493	1	Oil gauge glass

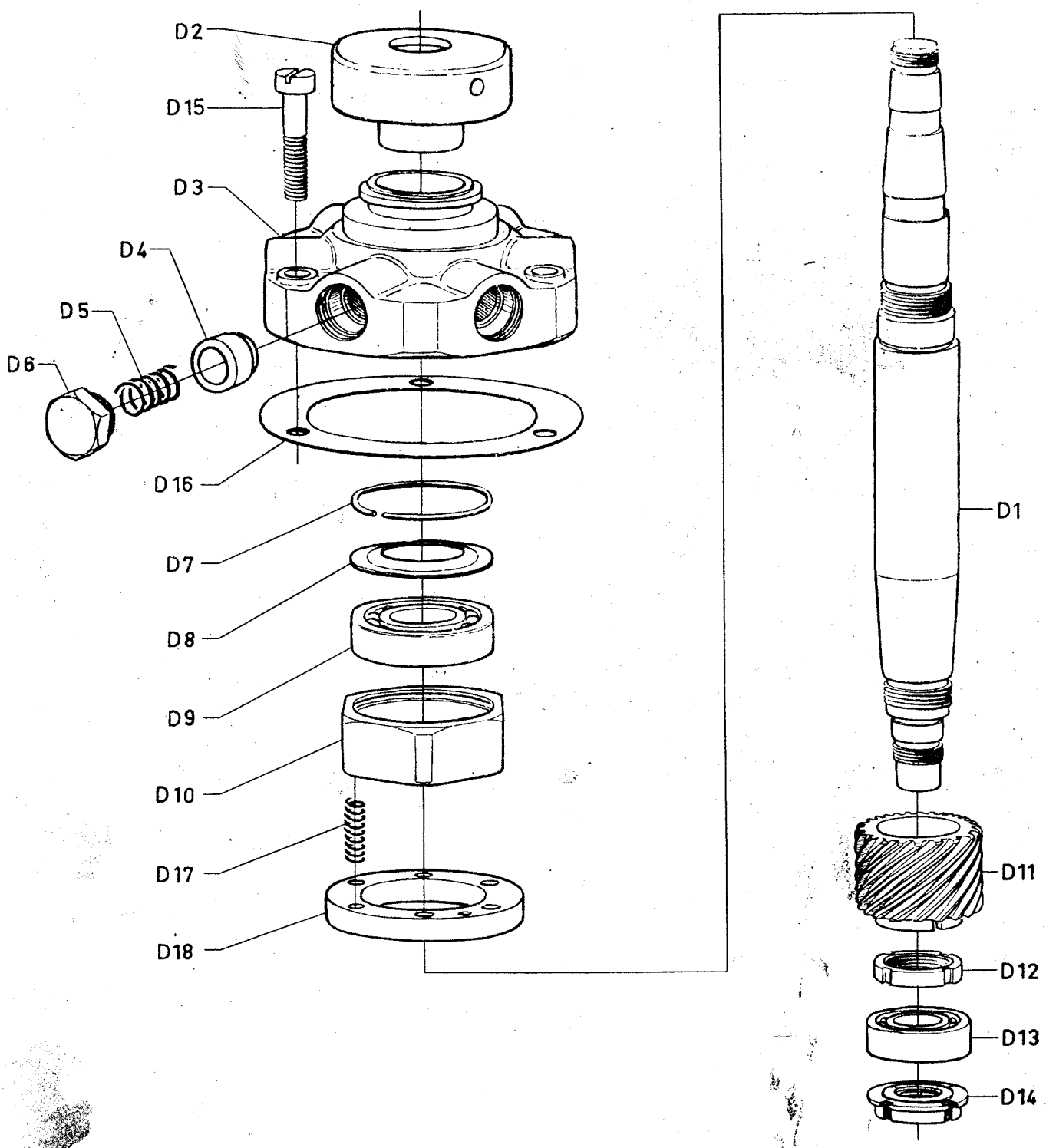

C9
f
C3
C1
C2
e
C7
f
a
C8
C5
C4
C11
C12
C6
C13
c
C10
b
d

Letter-ing	Part number 2231M&T	Part number 2251M&T	Quan-tity	
C	43288 x	43392 x		Separator bowl (with set of bowl discs, bowl body, bowl hood and distributor of stainless steel)
C1	43294 x	43344 x	1	Paring chamber cover
C2	7183	2275 – 2	1	Rubber ring
C3	10666	30684	1	Lock ring, small
C4	43289 x	43345 x	1	Top disc
C5	-	67393 – 2	1	Rubber ring
C6	x1)	x1)	1	Distributor
C7	x1)	x1)	1	Bowl hood
C8	67814	11402 – 2	1	Rubber ring
C9	x1)	x1)	1	Lock ring, large
C10	x1)	x1)	1	Bowl body
C11	9628	9632		Bowl disc
C12	9631	9003	1	Bottom disc
C11&12	43316	43390		Disc set (without top disc) x2)
C13	43311 x	43311 x	1	Cap nut

a	Guide lug on bowl hood
b	Guide notch in bowl body
c	Guide notch in distributor
d	Guide pin on bowl body
e	Guide pin on bowl hood
f	Guide mark on lock ring and bowl hood

x1) Exchange of these parts necessitates rebalancing of the bowl and can thus be carried out only in our workshops.

x2) See directions on page 19.


D2
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D13
D14

Lettering	Part number 2231M&T 2251M&T	Quantity	
D1-14	see table		Bowl spindle with top and bottom bearings

Type	Part number
2231M&T	43319 x
2231M-60	43321 x
2251M&T	43395 x
2251M-60	43396 x

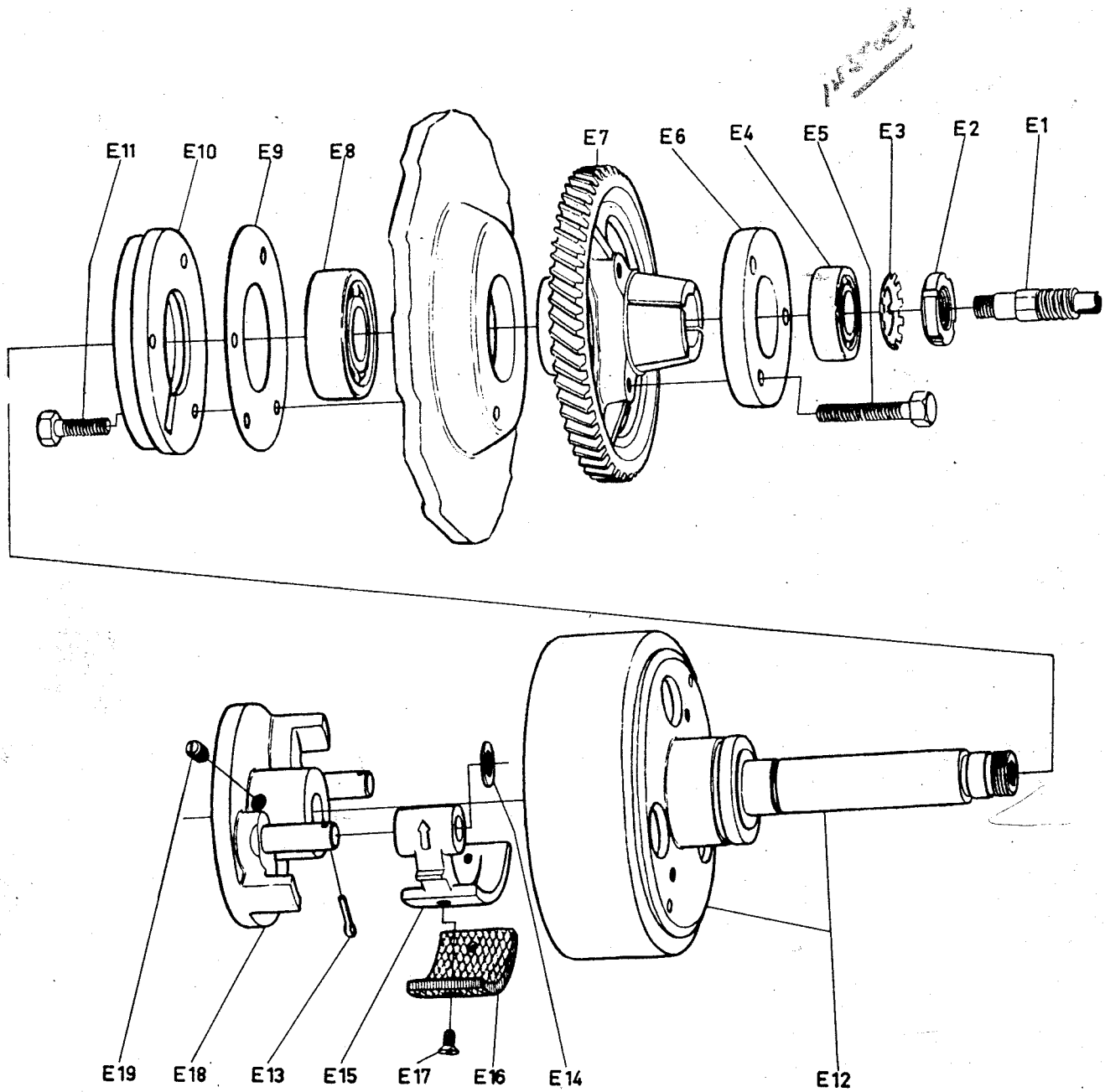
D1	43322 x	1	Bowl spindle
D2	43332 x	1	Lock nut for D9
D3	43330 x	1	Spring casing
D4	10597	6	Buffer
D5	5938	6	Spring
D6	43331 x	6	Screw plug
D7	43329 x	1	Elastic ring
D8	43328 x	1	Protective washer
D9 SKF 6207	43059 x	1	Ball bearing x1)
D10	43327 x	1	Ball bearing bushing
D11	see table	1	Worm

Type	Part number
2231M&T	43323 x
2231M-60	43324 x
2251M&T	43384 x
2251M-60	43385 x

D12	43325 x	1	Round nut for D11
D13 SKF 1205	43060 x	1	Ball bearing
D14	43326 x	1	Lock nut for D13
D15	43335 x	3	Screw for D3
D16	10640	1	Packing for D3
D17	9699	6	Supporting spring
D18	43333 x	1	Guide ring for D17

Cap nut - see page 33

x1) As this ball bearing is of special design, new bearings can be ordered only from an ALFA-LAVAL-representative.


E11
E10
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E17
E16
E14
E12

Lettering	Part number 2231M&T 2251M&T	Quantity	
E1	43339 x	1	Worm gear for revolution counter
E2-3	38682	1	Round nut with lock washer
E3	38159	1	Lock washer
E4	10455	1	Ball bearing, loose
E5	38957	3	Screw for E6
E6	11540	1	Clamping ring
E7	see table	1	Worm wheel

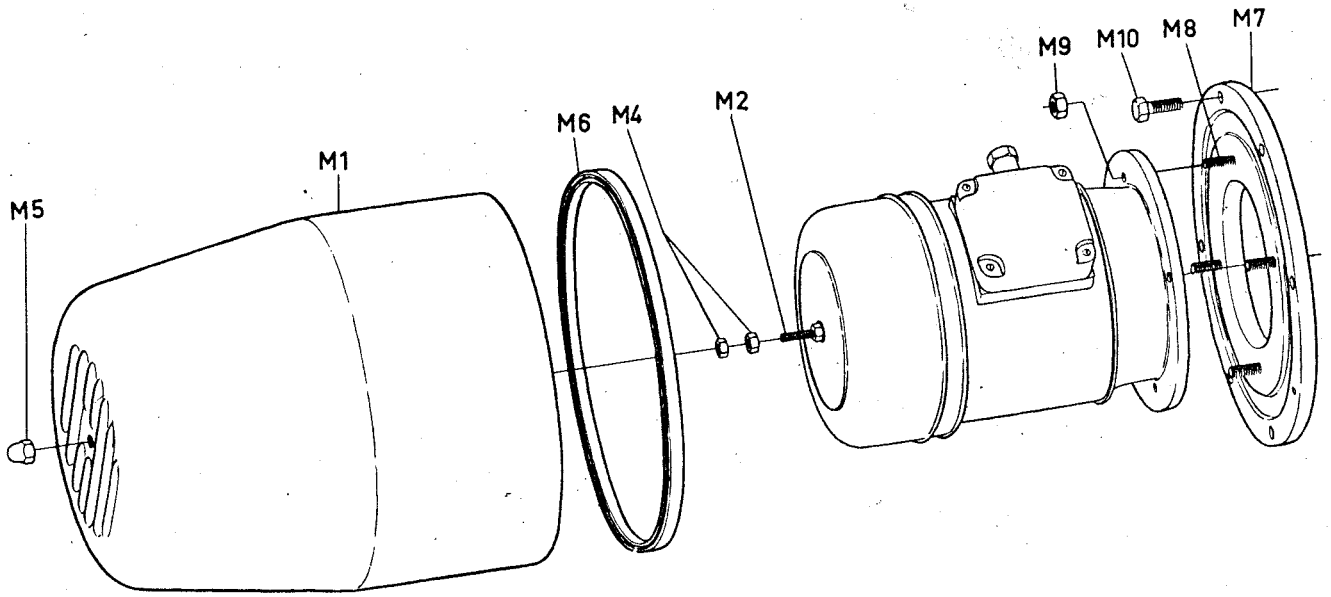
Type	Part number
2231M&T	43365 x
2231M-60	43366 x
2251M&T	43382 x
2251M-60	43383 x

E8-[illegible]	6525	1	Ball bearing, fixed
E9	11547	1	Packing for E10
E10	11546	1	Protecting cover
E11	34963	3	Screw for E10
E12	43336 x	1	Worm wheel shaft with conveyor pulley and round nut E2
E13	8114	2	Split pin
E14	8115	2	Washer
E15-17	see table		Friction blocks, a pair

Type	Part number
2231M&T	43370 x
2231M-60	43373 x
2251M&T	43376 x
2251M-60	43379 x

E16-17	8107	2	Friction pad with screws (one pad per friction block)
E17	8341	4	Screw for E16 (two screws per friction pad)
E18-19	43367 x	1	Coupling pulley with set screw x1)
E19	17569	1	Set screw for E18

x1) With center-drilled shaft hole, or turned up according to order.


M9
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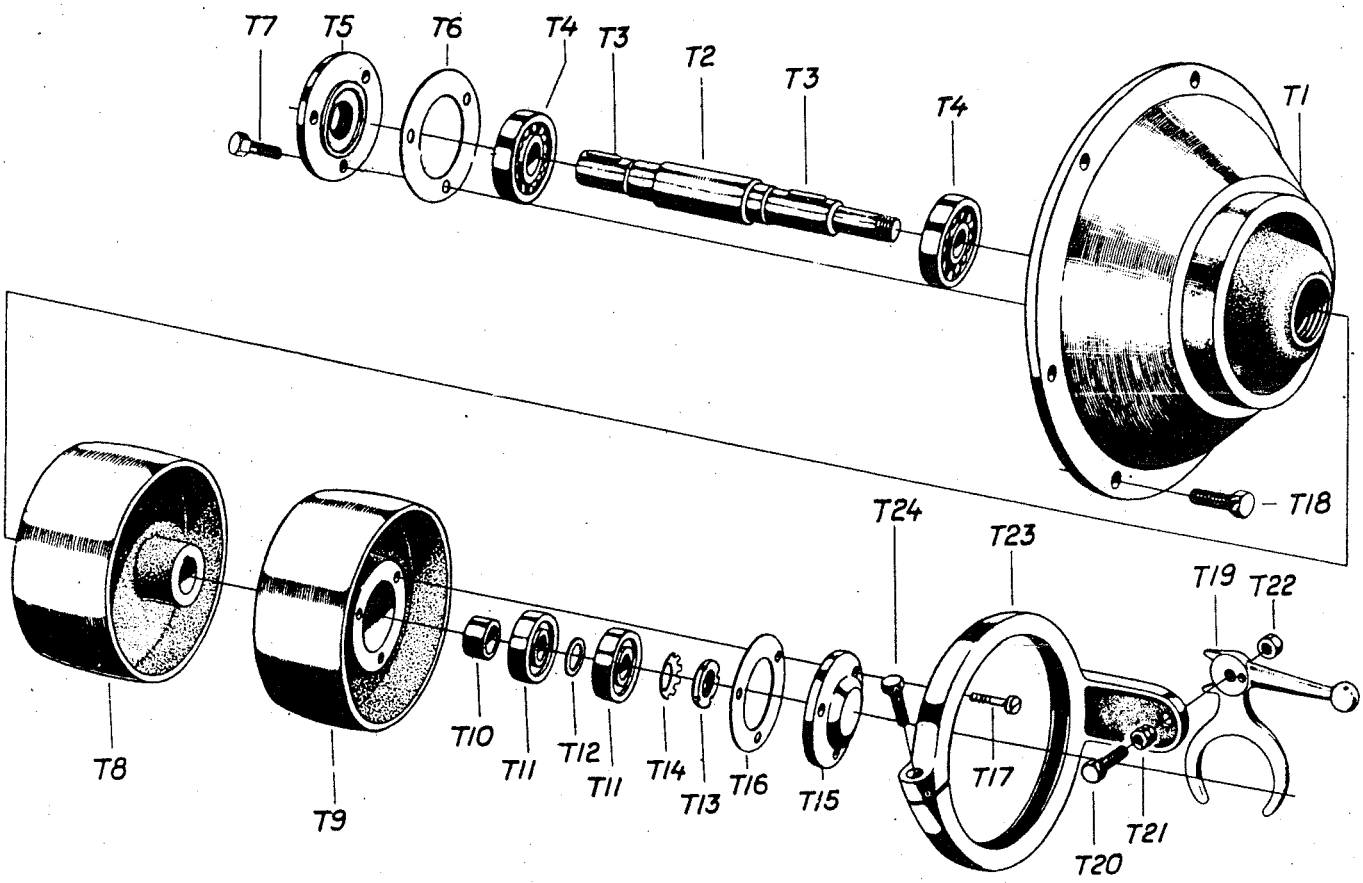
M5


T7
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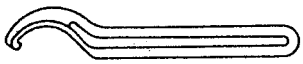
T16
T15
T17
T21
T20

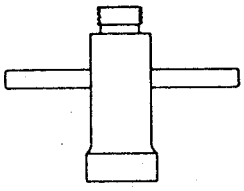
Lettering	Part number	Quantity		
			MOTOR ADAPTER, "M"-DRIVE	
M1	43409 x	1	Protecting hood	Suited for use with motor AEG KOM 53e-4 and KOM 53g-4
M2	o	1	Stud bolt M10x35 DIN 938/5D	
M4	o	2	Nut BM10 DIN 439	
M5	o	1	Cap nut Ri M10 DIN 1587	
M6	43418 x	1	Seal strip	
M7-9	43416 x	1	Motor adapter, complete	
M8	70488	4	Stud bolt	
M9	41330	4	Nut	
M10	38544	6	Screw	
			BELT GEARING, "T"-DRIVE	
T1-17	43397 x	1	Belt gearing	
T1	43398 x	1	End shield	
T2-3	43399 x	1	Shaft, with flat keys	
T3	43205	2	Flat key	
T4	8726	2	Ball bearing for end shield	
T5	43401 x	1	Protecting cover	
T6	38164	1	Packing	
T7	40988	3	Screw	
T8	43403 x	1	Fast belt pulley	
T9	43404 x	1	Loose belt pulley	
T10	11634	1	Spacing sleeve	
T11	11455	2	Ball bearing for loose belt pulley	
T12	11635	1	Spacing washer	
T13-14	38682	1	Round nut with lock washer	
T14	38159	1	Lock washer	
T15	11636	1	Protecting cover	
T16	11637	1	Packing	
T17	12172	3	Screw	
T18	38544	6	Screw for end shield	
T19	43320	1	Belt shifter	
T20	41268	1	Screw	
T21	11640	1	Spring	
T22	40036	1	Nut	
T23	43405x	1	Holder	
T24	64741	1	Screw	



V 1

V 2

V 3



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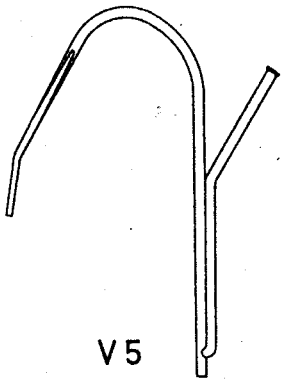

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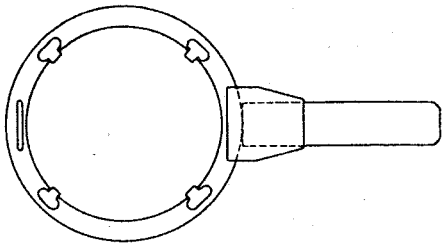

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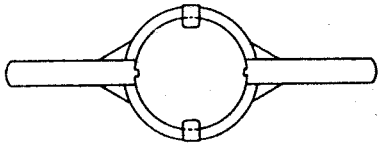

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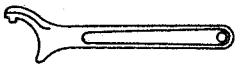
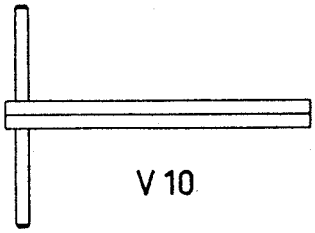
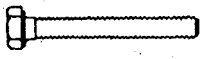


V 8

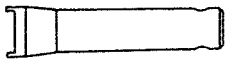
V 9



V 10

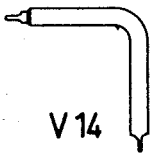


V 11

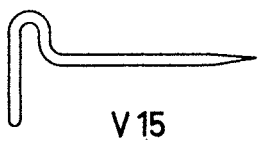


V 12

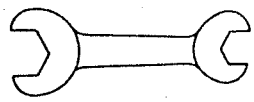
V 13



V 14



V 15



V 16

TOOLS

Lettering	Part number 2231M&T	Part number 2251M&T		
			for separator bowl and pipe couplings	
V1	11782	11782	Hook spanner	for pipe couplings 25&38 mm (1-1 1/2")
V2	6976	6976	Brush	" frame hood
V3	20315	20315	Brush	" bowl hood
V4	43262x	43262x	Lifting tool	" distributor and bowl body
V5	6962	5878	Siphon	" bowl draining
V6	32241	6378	Spanner	" lock ring, large
V7	10681	30716	Spanner	" lock ring, small
-	6968	6380	Wooden stand	" distributor
-	9745	9745	Disc drier	" bowl discs
			for vertical driving device	
V8	60982	60982	Hook spanner	for round nut D12 and lock nut D14
V9	9279	9279	Hook spanner	" lock nut D2
			for horizontal driving device	
V10	11647	11647	Socket wrench	for screw E5 for clamping ring
V11	65389	65389	Jack screw (two)	" ball bearing E8
V12	62522	62522	Pin spanner	" round nut E2
			Other tools	
V13	2279	2279	Drift	
V14	8594	8594	Screw driver, small	
V15	14486	14486	Screw driver, large	
V16	8432	8432	Screw spanner, 23-31 mm (29/32-1 7/32")	

ACCOMPANYING SPARE PARTS

Lettering	Part number 2231M&T	Part number 2251M&T	Quantity	
A5	43026	43026	2	Height adjusting ring
A11	10606	10485	1	Rubber ring for paring disc
C2	7183	2275	1	Rubber ring for paring chamber cover
C5	-	67393	1	Rubber ring for top disc
C8	67814	11402	1	Rubber ring for bowl hood
C11	9628	9632	1	Bowl disc
E16	8107	8107	2	Friction pad (with screws) for friction block