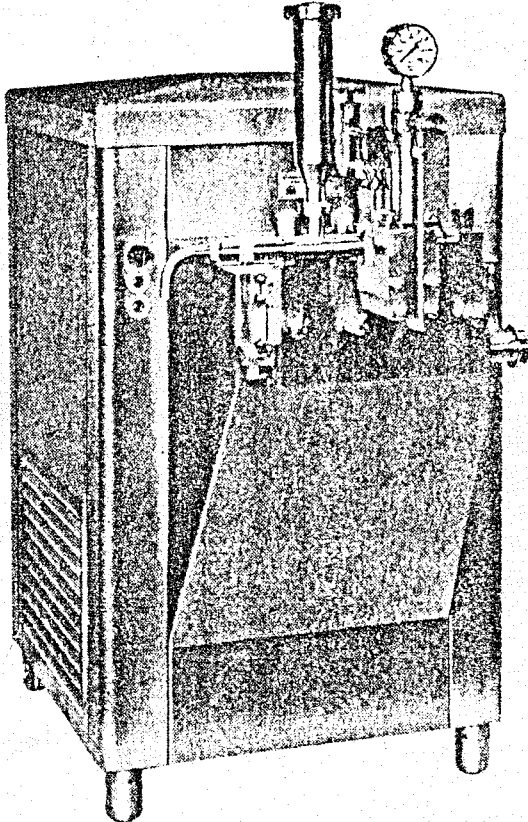




RANNIE
HOMOGENISERS
BLUE-TOP (MULTI-MIC)

NN
MACHINERY WORLD



Instruction no. 488 E

**Instructions for the erection and operation of
RANNIE homogenisers
Model BLUE-TOP (MULTI-MIC) 700-5000 l/h**

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ERECTION

Figs. 1, 3, 4 & 6

In the RANNIE BLUE-TOP (MULTI-MIC) homogeniser, the motor and V-belt drive are fully enclosed in the stainless steel casing, which is provided with large, easily detachable sheets and efficient ventilation permitting the use of a motor, 785, in protected ventilated execution. The front of the steel casing is provided with a built-in push-button switch, 806, for starting and stopping, and at signal lamp, 900, which lights when the current is on.

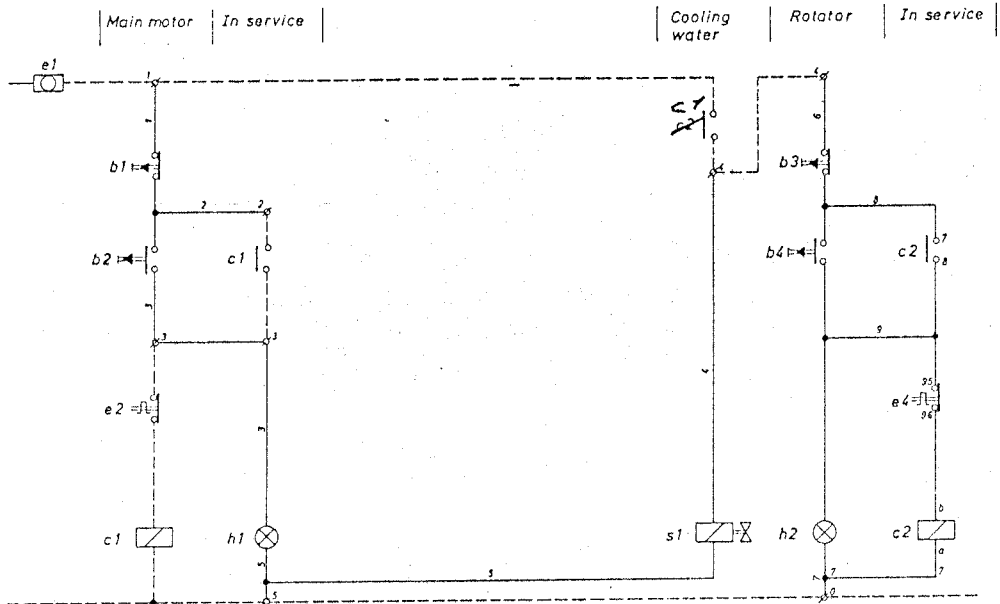
Erection As the homogeniser is provided with 4 adjustable feet, 797, it may be erected on even a rough floor without requiring any base.

Direction of rotation To avoid undue stresses in the crosshead bearing and attain the best possible lubrication, the machine should be rotating in the direction giving the vertical pressure on the crosshead a downward component. The direction of rotation is indicated by an arrow on the V-belt pulley or on the bearing cover.

Power connection The motor may be connected to a magneto-operated motor starter, mounted centrally in the power-installation.

Please, note!

From March 1972 the prefuse box 654a has been removed, and the hand-operated motor starter for electric rotator has been replaced by a separate motor starter 1209 and the start-stop switch 654. This alteration also offers the possibility of a remote control.



b 1 Stop } Motor
b 2 Start }

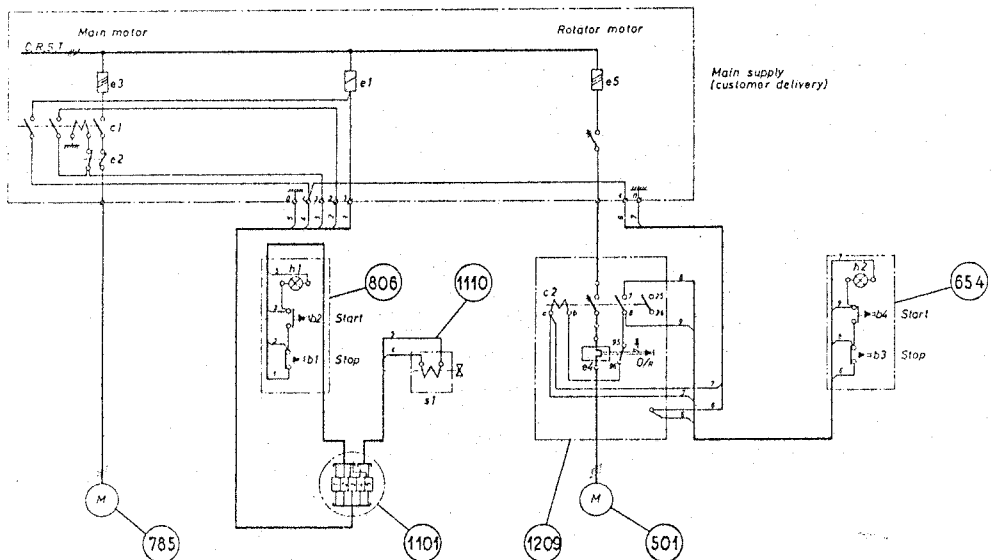
b 3 Stop } Rotator
b 4 Start }

c 1 Contactor for main motor
c 2 Contactor for Rotator

e 1 Control circuit fuse
e 2 Overload fuse, main motor
e 4 Overload fuse, Rotator

h 1 In service lamp, main motor
h 2 In service lamp, Rotator

s 1 Solenoid valve, cooling water



Homogenisers with self-grinding homogenising heads with electric rotators must be connected together with the driving motor as shown on the diagram, page 2.

When the motor has been mounted on the adjustable bracket, the V-belts are tightened slightly, after the first day of operation they are re-tightened.

In order to inspect and, if required, to repair the moving parts of the machine, it is only necessary to dismantle the right and the left side sheets.

Dismounting
of stainless
sidesheets

After the cover has been taken off and the grill sheets have been removed, the sidesheets can be removed by loosening the inside screws.

The homogeniser is equipped with a water cooling system for cooling the oil in the eccentric sump and for lubrication of the cylinder U-rings.

Water
cooling

A $\frac{3}{8}$ " water pipe is connected to the supply junction with regulating valve 847 (see Fig. 3), and a magnetic valve 1110 is inserted just above the regulating valve.

The regulating valve 847 should be adjusted only once, and the magnetic valve 1110 opens, when the machine is started up, and closes, when the machine is stopped.

From the cylinder sump, the water flows through a drain pipe, 903, to the floor, so a floor drain should be located close to the homogeniser.

As shown in Fig. 6, the inlet-pipe, 623, of the homogeniser is connected to the three-way cock, 624, and must be so arranged that the product may flow to the homogeniser without forming air-pockets, because: **any admixture of air will be detrimental to homogenisation.**

Pipe system

No stop valve should be fitted in the discharge pipe, but where the after-treatment takes place in a closed system it is necessary to provide the homogeniser with a pipe-protecting valve and a pressure air-vessel as shown on fig. 2C.

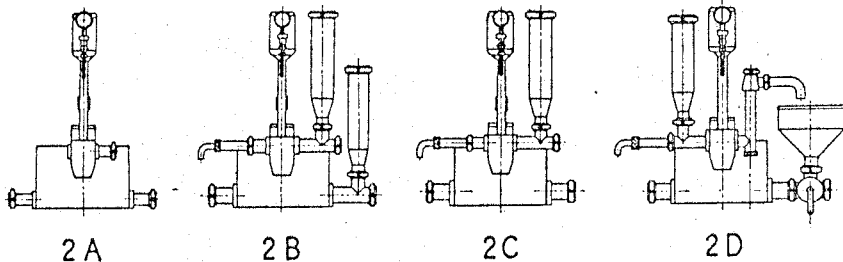
Discharge
pipe

Pipe-pro-
tecting valve

If the product is led to the homogeniser under pressure there also ought to be placed an air-vessel at the inlet pipe as shown on fig. 2B.

Air-vessel

Furthermore the homogeniser can be fitted with threeway cock, by-pass funnel and by-pass swing cock as shown on fig. 2D.



By-pass
in the pipe
system

If in the pipe installation there is a by-pass for the homogeniser, this can work without the three-way cock, the by-pass funnel, and the by-pass swing-cock, as shown in fig. 2A.

Initial
cleaning

When erection has been completed, the homogeniser must be carefully cleaned, so as to ensure that all dust and plaster that may have penetrated into the machine during the erection, will be completely removed.

Oil-filling

Fill the eccentric sump with oil to the middle of the oil-level gauge, (centre of the eccentric shaft) which is arranged as the central end cover at the back of the homogeniser.

The following quantities of oil should be used.

For size 24-60	700-1000 l/h	18 litres
» 30-60	1300-2000 l/h	18 »
» 36-72	2000-3000 l/h	41 »
» 45-72	3500-5000 l/h	41 »

of one of the types of oil enumerated below:

BP Energol ME 250-CR
 CALTEX Marine Oil 220 x (x grade 38x)
 CASTROL RD Oil nr.3
 ESSO Marmax 66
 GULF Marine Engine Oil 77
 MOBIL VOCO Engine Oil 1
 SHELL Nautilus Oil 69

The first oil should be renewed after 50 hours of service, and after this the oil should be renewed at least every 1000 hours.

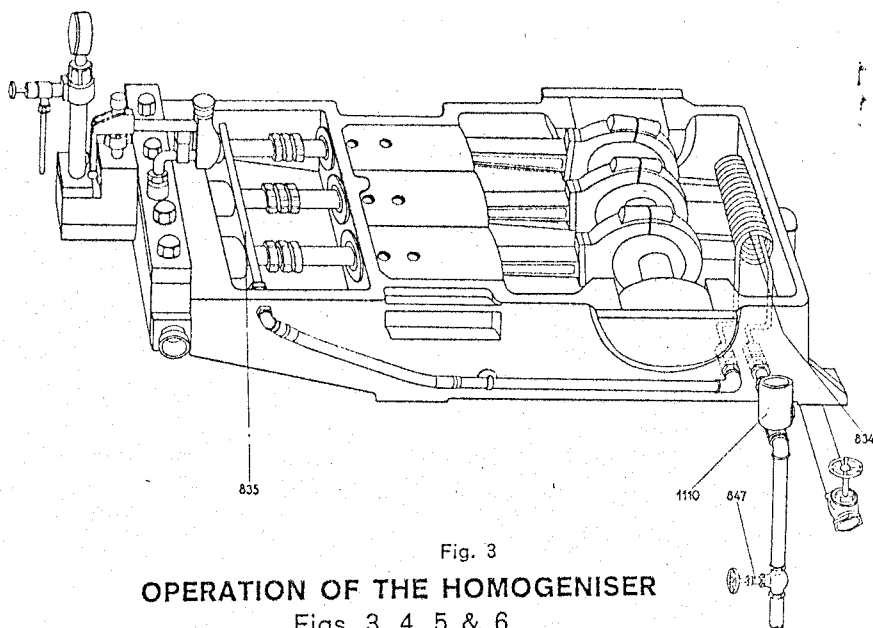


Fig. 3

OPERATION OF THE HOMOGENISER

Figs. 3, 4, 5 & 6

Never let the homogeniser run dry of liquid while in operation.

If the homogeniser should run dry while the homogenising head is under pressure load, the pressure gauge may burst, and in machines with self-grinding homogenising head, the head will also be destroyed.

Warning

Before operation is started, the homogeniser is given a trial run and heated up with hot water filled into the by-pass funnel, 618. Then proceed in the following manner:

1. Turn the three-way cock, 625, to by-pass position.
2. Turn the swing cock, 615, to by-pass position above the funnel (within the arc shown in Fig. 5).
3. Relieve the pressure on the homogenising head, by loosening the pressure control screw, 602.
4. Open the water supply valve, 847, a half-turn, so that water supply for the pistons is ensured as soon as the motor and thereby the magnetic valve are getting current.

It is of decisive importance for the life of the cylinder U-rings, that the water supply functions while the homogeniser is operating.

Water-lubricating of cylinder stuffing-boxes

5. Start the homogeniser by pushing in the start button, 901.
6. Open the airing and rinsing valve, 661, so that air in the homogeniser may be expelled. Close the valve.

Pressure
load

7. Adjust the water supply valve so that the water is just running down the piston parts, 716.

Airing

Irregular deflections of the pressure gauge, 550, are, as a rule, due to air in the valve system. The system must then be aired immediately by relieving the pressure on the homogenising head. Unscrew the pressure control screw, 602, and, if this proves insufficient, swing clasp, 597, with the pressure control screw a side and lift the crutch lever, 603, as far as possible. Thereby, the upper part, 590, of the homogenising head will be raised, so that any air accumulated under the homogenising head may freely escape.

Draining

When the valve housing and cylinders have attained the temperature suitable for the product to be homogenised, the pressure on the homogenising head is relieved, the homogeniser is stopped and the hot water drained off by unscrewing the cap nut, 647, on the side of the valve housing opposite to the inlet and swing cock, and pulling the filter, 641, slightly out.

The discharge pipe, 606, is emptied by unscrewing the union nut of the swing cock body.

Starting
with product

When the water has been drained off, the filter, 641, is replaced, cap nut, 647, screwed on and the homogenising product admitted. When the valve housing is entirely filled, the swing-cock, 615, is swung just outside the funnel, 618, see Fig. 5, to the front of the homogeniser, which is then started.

By-pass

The water-mixed product which is first expelled from the swing-cock, 615, is collected in a bucket. The swing-cock is swung above the funnel to by-pass position, and at the same time, the three-way cock, 625, is set at by-pass.

Homogenising
pressure

The pressure control screw, 602, is now adjusted to the desired pressure, whereupon the lock-nut, 601, is tightened up and the by-pass is shut off by turning the swing-cock above the by-pass funnel to the extreme rear edge of the funnel, that is, away from the front of the homogeniser. Before the by-pass funnel will run empty the three-way cock is turned to inlet position. The product will now leave the homogeniser through the discharge pipe, 606.

Irregular operation, which is immediately indicated by irregular deflections on the pressure gauge, 550, will in most case be due

to admixture of air or impurities in the product, which may impede the normal functioning of the valves and clog the filter.

If irregularities continue, it will be necessary to stop the feeding and to turn the spout of the by-pass swing cock, 615, round before the front edge of the funnel, 618, so that the swing cock still is open. After this you start the homogeniser.

↑
Irregular
operation

Defective airing spoil the pressure gauge.

If the airing proves insufficient to make the homogeniser work regularly, it will be necessary to remove and clean the valves, 578 and 580, as described in the following under heading "Valve-housing" page 11.

When the homogenising process is nearing completion, it is necessary, before the machine runs empty, to open the by-pass as previously described, and in this manner – by means of the by-pass – homogenise the last residue of the product.

Homo-
genising
of residual
product

Never let the homogeniser run dry of liquid while it is under pressure load.

Although everything possible has been done, by cooling of the oil in the eccentric sump and by other means, in order to keep the formation of condense water, produced by fluctuating temperatures, down on a minimum, it is still impossible to avoid that drops of condense water accumulate on the under side of the cover 802 over the eccentric sump, dripping in the oil. The oil, as specified in the section about oil filling, page 3, is a marine oil quality, which is able to absorb a maximum of water without losing its lubricating faculty; substances have been added to counteract the formation of rust and oxydation.

Exchange
of oil

The first oil should be changed after 50 working hours and hereafter exchange of oil should take place regularly after every 1000 working hours.

If the oil level should have sunk to under normal oil level (middle of the oil level glass) because of leak, all the oil should be drawn and fresh oil refilled. Oils of different marks and qualities should never be mixed.

CLEANING AND STERILIZATION

Cleaning should be commenced immediately upon completion of the homogenising process and in the 5 following manner:

Ordinary
cleaning

1. Rinse with pure, running water for 5 minutes.
2. Circulate for 5–10 minutes a 0.5 % solution of alkaline lye at a temperature of 70° C. (160° F.) through the machine (i. e. 50 g (700 grains) detergent to 10 litres (2 galls) water). As cleaning agent, a mixture of $\frac{2}{3}$ caustic soda and $\frac{1}{3}$ tri-sodium phosphate or any effective detergent suitable for mechanical bottle-cleaning, for instance Calgonite G or P₃-Super S 100, may be used.
3. Rinse again with pure, running water for 5 minutes, stop the homogeniser and let the water remain until the next period of operation.
4. Immediately before starting, sterilize the machine for 2 minutes by circulating a 70° C. (160° F.) solution of chlorine containing about 100 ml bleaching extract with 15 % sodium-hypochlorite (NaClO) per 10 litres of water.

Removal of
incrustations

In dairies, where incrustation of the contact surfaces often occurs, the following method may be recommended:

1. Rinse with pure, running water for 5 minutes.
2. Circulate for 5–10 minutes a 65° C. (150° F.) hot acid solution consisting of 50 ml nitric acid (62 %) per 10 litres of water.
3. Rinse again with pure, running water for 5 minutes.
4. Circulate for 5–10 minutes a 0.5 % solution of alkaline lye (50 g (700 grains) detergent to 10 litres (2 galls) water at a temperature of 70° C. (160° F.). As cleaning agent may be used, a mixture of $\frac{2}{3}$ caustic soda and $\frac{1}{3}$ tri-sodium phosphate or any effective detergent suitable for mechanical bottle-cleaning, such as Calgonite G or P₃-Super S 100.
5. Rinse again with pure, running water for 5 minutes. Stop the homogeniser and leave the water until the next period of operation.
6. Immediately before starting, sterilize the machine for 2 minutes by circulating a 70° C. (160° F.) hot chlorine solution containing about 100 ml bleaching extract with 15 % sodium-hypochlorite (NaClO) per 10 litres of water.

Formation
of cavity

During homogenisation the effect of cavity formation will be positively utilized when the homogenising head is under pressure load, but during cleaning all formation of cavity will be harmful.

It is therefore poor economy to circulate cleaning and sterilization liquids for unduly protracted periods, more especially when

the machine is under pressure load, as wear due to formation of cavity will thereby be activated.

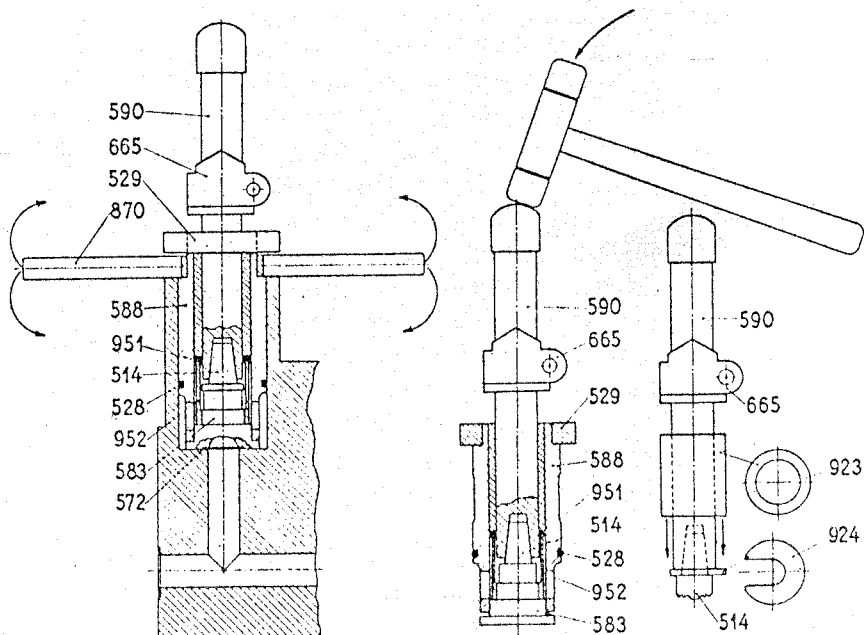
Therefore the homogeniser must not be under pressure load during cleaning.

The cleaning agents should be dissolved in a bucket, and care must be taken to strain off insoluble matter and impurities before the solutions is poured into the funnel of the machine.

If the homogeniser is used for a product requiring cleaning agents other than those mentioned above, please consult the factory before cleaning is commenced.

STRIPPING OF STATIC HOMOGENISING HEAD

Loosen the pressure control screw, 602, and swing the tension clasp, 597, aside, pull out the pin, 654, and remove the crutch lever, 603. Loosen the screws, 524, and lift up the flange, 529, in order to fit the split pull off ring, 870, – from the tool box – on the neck of the guide, 588. Move the tool in alternating directions and exert a simultaneous pull on the handles. This will make all the parts 514 – 583 – 588 – 590 – 952 come out in one operation.



Remove the split pull off ring 870, and loosen the lower part, 583, of the homogenising head with a blow from a wooden hammer against the upper end of the spindle 590 (see fig. 7). At the same time also the stay ring, 952, will fall out. The spindle, 590, with the upper part, 514, are pulled out of the guide, 588, and the stripping tool, 923, and 924 are placed as shown on Fig. 7 sliding the ring, 923, over the spindle, 590, and wedging the crutch, 924, between the spindle, 590, and the upper part, 514. Knock down the ring, 923, against the crutch, 924, by which the upper part, 514, is loosened from the spindle, 590.

Incrustations If incrustations have formed on the lower end of the spindle, 590, this cover must be carefully removed with fine emery cloth before pulling the spindle out of the guide, 588.

Spare homogenising head Before mounting the spare homogenising head – that must always be ready in the tool box – clean all the separate parts carefully and renew defective packings.

Cleaning It is most important that all contact surfaces are completely clean and smooth, hence avoid all risk of knocking and scratching when cleaning, do not place the parts on the floor but on a wooden table or bench.

Mounting It is very important to moisten the O-ring 528 and the U-ring 951 with water before starting the mounting. Fit the O-ring and the U-ring in place in the guide 588 and place the split pull off ring, 870, on the neck of the guide, 588, and place the flange, 529, on the top of this. Now the spindle, 590, with the knife-edge bearing, 665, is placed in the guide, 588. With a light blow with a wooden hammer, the upper part, 514 of the homogenising head is affixed to the spindle. Place the O-ring, 572, in the recess in the base of the lower part, 583, and insert the part 952 and 583 in the guide, 588. Fasten the split pull off ring, 870, on the neck of the guide, 588, and put the whole assembly in place in the bracket, 575, and remove the split pull off ring, and fasten the flange, 529, by screwing the screws, 524, home. The knife-edge bearing, 665, is mounted in such a position that the crutch lever, 603, will be horizontal when the upper part 514 bear about the lower part.

MAINTENANCE OF HOMOGENISING HEAD

As soon as the homogenising surfaces of the homogenising head show perceptible signs of wear, the head should be re-

placed before it proves necessary to promote the homogenising effect by an increase of pressure.

It is bad economy to continue operations with a heavily worn homogenising head, and if an attempt is made to eliminate the consequences of wear by increasing the pressure, both power consumption and wear will be increased, so that finally it may be necessary to condemn the homogenising head because it is beyond repair.

Bad
economy

If a product is handled, which, due to its content of solids, exposes the homogenising head to abnormal wear, one or more homogenising heads besides the spare head should be provided.

Heavy wear

PRESSURE GAUGE

Figs. 4, 6 & 9

All RANNIE homogenisers are fitted with sanitary compensating pressure gauges with bulb, 550, mounted in the column, 662, which is in direct connection with the pressure chamber of the homogeniser. The bulb of the pressure gauge is filled with liquid, which is indirectly affected by the surrounding pressure and causes the pressure gauge to register. The pressure gauge casing is strong and robust and is provided with a built-in damping device so that a pressure gauge valve may be dispensed with.

This indirect operation of the pressure gauge spring gives the pressure gauge a long life, and in connection with the elimination of the pressure gauge valve, entails a great hygienic improvement. To facilitate cleaning of the column, 662, on which the pressure gauge is mounted, the column is provided with rinsing valve, 661, which, of course, must be kept closed while the homogeniser is in operation, but which during clearing, must be opened instantaneously once during each of the cleaning processes. See under heading: "Cleaning and Sterilization", page 7.

Hygienic

Even if the pressure gauges used are always of the best manufacture, they are covered by no guarantee, as even the best pressure gauge may be ruined in an instant by faulty operation.

No
guarantee

VALVE HOUSING

Figs. 4 & 6

The valve housing, 579, and the valves, 578 and 580, are made of rolled, stainless steel of 18/8 quality. The valves are provided

with long guides and springs, 577 and 581, and are designed with large flow areas ensuring a low velocity of flow, which in connection with the rapid closing obtained through the spring load, is a condition precedent to regular and reliable operations of high efficiency.

Irregular
operation

Impurities or fat deposits adhering to valve or valve seats may interfere with the normal operation of the valves. This will result in irregular operation and corresponding irregular deflections on the pressure gauge, 550. If the deflections become so wide that the gauge drops to zero, this will indicate that one of the valves is completely blocked.

Cleaning
of valves

In such cases the machine should instantly be stopped and the liquid drained off. Unscrew the nuts, 652, securing the top cover for the valve-housing, and when the cover, 584, has been removed, valves and springs may be pulled out by means of the valve lift tool, provided in the tool box.

Valves, springs and seats in the valve housing, should be carefully cleaned and when all impurities have been removed from the valve housing, the valves and springs are reassembled, and if necessary the O-rings, 573, are replaced with new ones. The cover, 584, is carefully mounted by alternating tightened the box nuts, 652, to avoid wryness.

This process must be repeated at frequent intervals for even if no irregularity is observed, it will provide an opportunity to keep a check on the valve seat surfaces, so that they may be ground in good time.

Incrustation

When milk, cream or similar products are being homogenised, incrustation may – particularly at high temperatures – occur in the valve housing and on valves or springs. Never use sharp cutting or scraping tools for the removal of such incrustations, but let an expert heat the parts with hydrochloric acid, after which, it will be necessary to have valves and seats reground.

Grinding
of valves

If the valve seats are badly worn, they should first be machined on a lathe, whereupon a suitable quantity of grinding compound (fine carborundum powder in suspension in acid free oil) is deposited on the valve seats. The valves are then, by means of the valve lift tool, put into place on their seats in the valve housing and with a light, downward pressure they are rotated in alternating directions. When the surfaces of valves and seats make contact

over whole surface, the results is good, and the valve housing and valves should then be thoroughly cleaned until all traces of grinding compound are removed.

PISTON STUFFING-BOXES

Fig. 10

Each of the cylinders, 718, contains a U-ring, 720, of synthetic rubber. It is kept in place in the cylinder between the stay-ring, 719, and the packing nipple, 721. It is clamed in place, when the packing nipple is tightened up against the cylinder, it will have a feed of 0,1-0,2 mm, a fact of importance of its proper functioning.

These sanitary rubber U-rings, which may be cleaned and sterilized in the course of the cleaning processes, will be perfectly tight at normal working pressure and will last for a satisfactory time, so long as the water supply – see Fig. 3 – functions normally during operation, that is, so long as a slight flow of water keeps trickling down over the pistons.

If the water supply fails, the homogeniser must at once be stopped, as otherwise the U-rings will be destroyed within a very short space of time.

When a defective U-ring is to be replaced, the following procedure should be used:

- A. Bring the piston to its extreme position farthest from the bottom of the cylinder.
- B. The union nuts on the piston coupling, 713, are loosened by means of the hook spanners provided and the piston part, 716, is pushed into the bottom of the cylinder. The coupling, 713, is then taken out and the packing-nipple, 721, unscrewed and removed.
- C. The piston part, 716, is withdrawn from the cylinder, so that it carries the defective U-ring, 720, along, and the old U-ring is re-placed by a new one.
- D. The large collar-bushing, 851, from the tool box, is pressed around the U-ring, and the assembly of piston part, U-ring and collar bushing is inserted in the cylinder.
- E. The small bushing, 852, is pushed into the large bushing, 851, and the U-ring is thereby pressed into place in the cylinder, whereupon the two bushings are removed.
- F. The packing nipple, 721, is screwed right home and coupling,

Water supply

Replacement
of U-ring

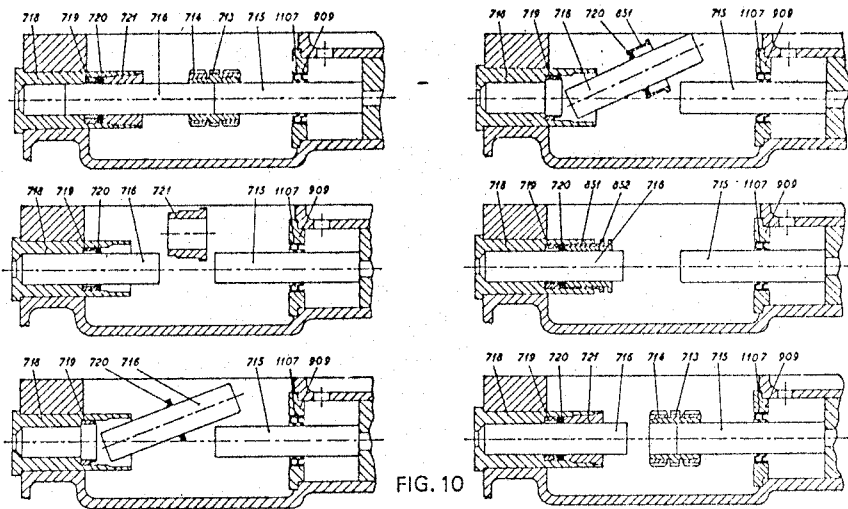


FIG. 10

Fig. 10

713, is replaced, making sure that the end of the coupling affixed to the piston part, 715, is aligned with the ring mark on piston part, 715. Before the union nuts of the coupling are tightened, see that the two parts of the piston are in full contact.

During operations A-F great care must be taken not to injure the ground surfaces of the parts of the piston, inasmuch as even the slightest scratch will damage the U-ring. Care must likewise be taken not to damage the external and internal lips of the U-ring.

STUFFING BOX IN CROSSHEAD

Stuffing-box
in cover for
crosshead
guide

In the stuffing-box at the crosshead guide 2 oil seal rings 1107 are mounted in the cover 909. The oil seal rings are replaced as follows:

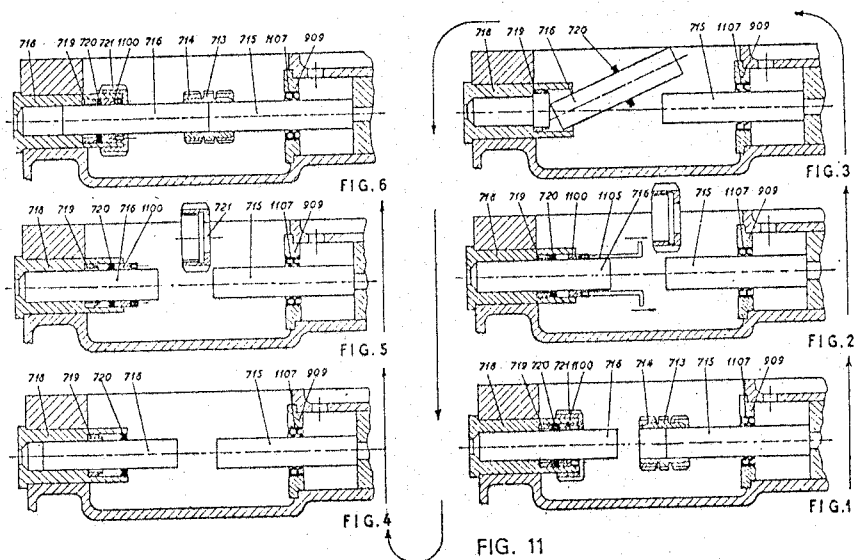
After placing the piston in question (as mentioned under A.) in its extreme position farthest away from the bottom of the cylinder, the union nuts 714 of the coupling 713 are loosened. The coupling and the piston part 716 are pushed as far as possible towards the bottom of the cylinder, after which the cover is removed and the oil seal rings are replaced by new ones.

During this replacement process it is very important not to scratch or score the piston parts 715 and 716.

Stuffing box for size 45.72.

Fig. 11

In this model the pack nipple, 721, is replaced by a union nut with loose distance ring. Here you have to use the following practice:



- A. Leaving the piston concerned stationary in its extreme position removed from the bottom of the cylinder.
- B. The union nuts on the piston coupling, 713, are loosened by means of the hook spanners provided, and the piston part, 716, is pushed into the bottom of the cylinder. The coupling, 713, is then taken out.
- C. Loosen the union nut, 721, at the cylinder and take it up. After this screw the two enclosed extractors, 1105, in the two screw thread holes in the distance ring, 1100, and you are now able to shift the distance ring out (Fig. 2).
- D. Draw the piston part, 716, out of the cylinder so that the defect U-ring, 720, is coming out with it, and put at new U-ring on the piston instead of the defect one (Fig. 3).

- E. Put the piston with U-ring in the cylinder so that the contact-face of the U-ring is plan with the end plate of the cylinder (Fig. 4).
- F. Put the distance ring, 1100, in over the piston, and use the union nut as mounting tool. Screw the union nut the whole way down (Fig. 5).
- G. The coupling, 713, is replaced, making sure that the end of the coupling affixed to the piston part, 715, is aligned with the ring mark on piston part, 715. Before the union of the coupling are tightened, see that the two parts of the piston are in full contact.

Do not tighten the union nuts too much, and have to be careful not to injure the surface of the pistons, as this could damage the U-rings while working (Fig. 6).

If the distance ring, 1100, is so firmly fixed in the cylinder that it is impossible to dismount it by means of the tools, 1105, you can use the following procedure for disentanglement:

- A. Loosen the union nut two turns.
- B. Start the homogeniser (with liquid in the circulation) and pressure-load it slowly. The pressure, which comes about in the cylinder, will push the U-ring and the distance ring loose.
- C. As soon as the distance ring is loose, stop the homogeniser and go on with the demounting as described above.