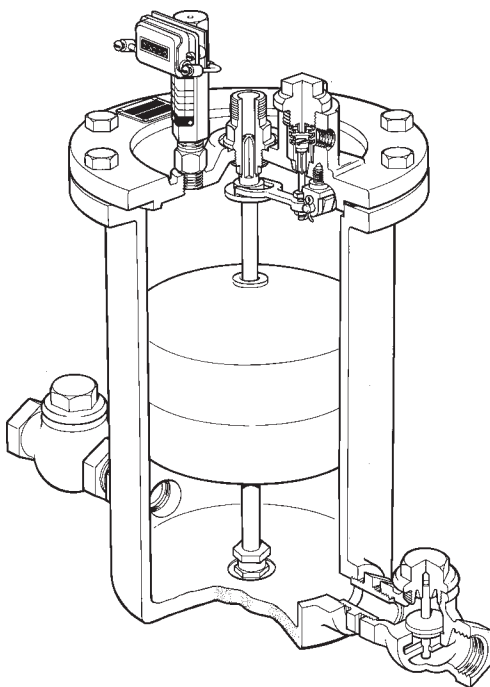

Spirax Sarco Ogden Automatic Pump

Installation and Maintenance Instructions



- 1. Installation & operation*
- 2. Maintenance*
- 3. Trouble tracing*
- 4. Available spares*
- 5. Special applications*

1. Installation and operation

1. Automatic pump (Fig. 1)

The Spirax Ogden automatic pump is supplied complete with inlet and outlet check valves. When despatched these check valves are packed in a separate carton. They are marked inlet and outlet on the hexagon of the body and have directional arrows cast on the body, and should be fitted accordingly. Only the check valves supplied with the pump should be used, see Section 1.11.

As despatched each Spirax Ogden automatic pump is individually fitted with valve gear most suitable for the conditions of operation stated on the order.

If the conditions of operation have changed then it is advisable to contact the manufacturers, Spirax-Sarco Ltd, notifying them of the revised conditions and the pump serial number.

They will then be able to tell you whether the pump is suitable for the revised duty, or whether it can be made suitable by replacement of the valve gear.

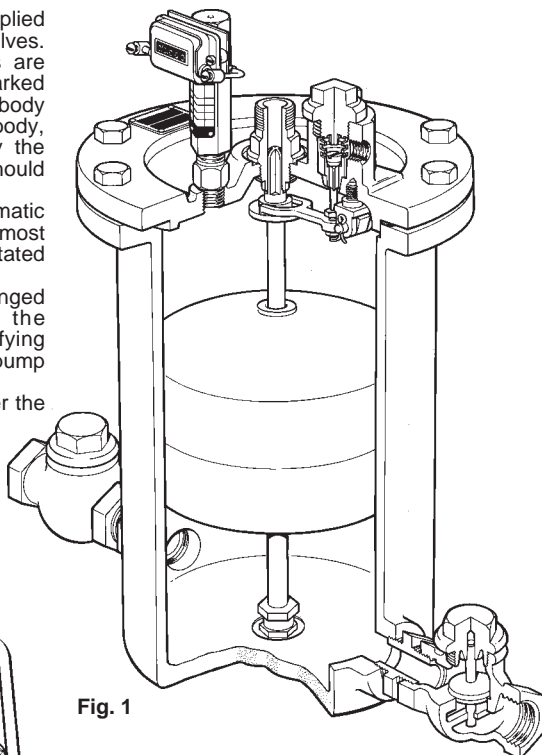


Fig. 1

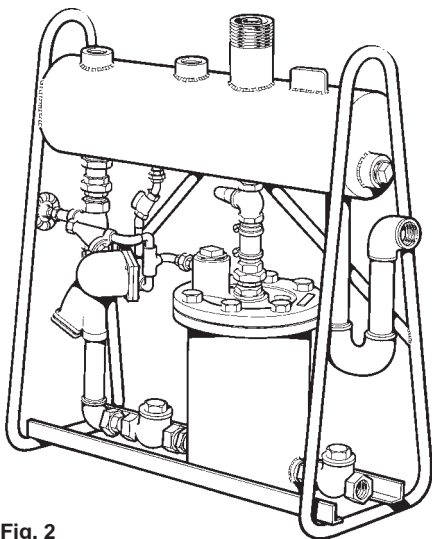


Fig. 2

2. Packaged pump unit (Fig. 2)

The Spirax Ogden automatic pump is available as a packaged unit. The pump, receiver and the necessary equipment is mounted in a rigid frame, to save the user time and trouble in setting up the installation.

Fig. 2 shows the unit when steam will be used as the operating medium.

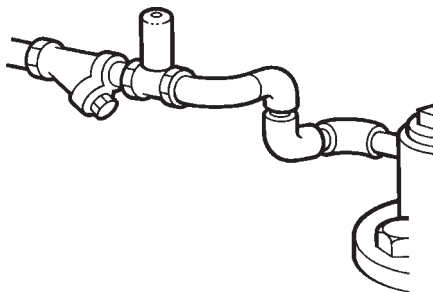


Fig. 3

Fig. 3 shows alternative arrangement when compressed air is used as the operating medium.

3. General arrangement

Fig. 4 shows the recommended installation layout to ensure satisfactory operation of the pump.

Particular attention is drawn to the fact that the exhaust from the pump is connected into the receiver vent pipe as in Fig. 5. In this way any exhaust or vapour which condenses in the pipe will drain back into the receiver. This arrangement should never be reversed as in Fig. 6.

4. The receiver

As shown in Fig. 4, a vented receiver must always be fitted on the filling side of the pump when it is being used for lifting condensate. The reason for this vented receiver is two-fold.

a. While the pump is discharging, the check valve on the inlet side is shut so that no condensate can flow into the pump body. If the main condensate return were to be connected direct to the pump inlet, there would be periodic interruptions of the condensate flow from the plant with the very real possibility of intermittent waterlogging and reduced plant efficiency.

b. After the discharge stroke, with no vented receiver fitted, there would be a turbulent, pressurised flow of this held-up condensate into the pump body, resulting in unnecessary wear of the working parts.

5. The receiver should have a capacity not less than twice the swept volume (litres per stroke) (galls per stroke) of the pump. Table 1 gives a guide to the size of receiver necessary.

6. The filling head

In order to overcome the frictional resistance of the filling line and to ensure at the same time a reasonable rate of filling, the bottom of the receiver should be not less than 300 mm (12") above the top of the pump.

Although this dimension of 300 mm (12") is given as the minimum filling head, it is considered to be the ideal and the filling head should not be more than 600 mm (24").

7. The vent pipe

The receiver should always be fitted with a vent pipe capable of releasing any pressure in the receiver down to atmospheric.

If pressure is allowed to build up in the receiver it will impose an additional back pressure on the traps discharging into the return main and furthermore, it will cause very turbulent conditions inside the pump during the filling stroke resulting in rapid wear.

This can happen where condensate is being handled from traps discharging from high pressure steam in which case some 10 % or more of the condensate may re-evaporate into flash steam.

Table 1 gives the recommended minimum vent pipe size for normal conditions but where large volumes of flash steam are being handled by the receiver it may be necessary to increase the vent pipe size to prevent a pressure build up. Unless the vent pipe is unduly long it is normally practical to size it on a maximum flash steam velocity of 10 - 20 m/s (30 - 50 ft sec.).

8. But to bring large quantities of flash steam back to the receiver can not only cause turbulent conditions in both the receiver and pump to the extent of interfering with the satisfactory operation of the pump. A continuous plume of flash being discharged from the vent pipe apart from being a nuisance, causing damage to building fabric etc, is extremely wasteful. Where so much flash is available it should be made use of by flash recovery. See Spirax Sarco guide covering flash steam.

9. Overflow

The overflow should be not less than the minimum size as shown in Table 1.

The water seal will prevent the escape of vapour through this pipe.

10. Operating medium

a. Steam

Where steam is the operating medium it must be dry if the pump is to work satisfactorily and the expected capacities are to be reached, especially on steam pressure approaching the minimum. The steam supply to the pump should be taken off the top of the main and should be lagged. It should also be drained just before the pump inlet as shown in the general arrangement layout Fig. 4.

A trap having a blast action should generally be avoided especially where the operating steam is at low pressure. A Spirax FT14 float trap is very suitable for all pressures up to 14 bar (200 psi).

b. Compressed air

Where compressed air is used to operate the pump whilst dry air is essential it is not generally considered necessary to fit a drain trap in Fig. 4 for steam operation.

Whilst dry air is essential when the pump is operated by compressed air, it is not usually necessary to fit the drain trap shown in Fig. 4 for steam operation.

With compressed air as the operating medium having no heat loss and being a dry gas, it can pass through the inlet valve and build up pressure in the pump body so quickly that in some cases the pump action becomes violent with excessive wear on the valve gear. In those cases where the pump is delivering into a long return line the pressure built up in the body is so much in excess of the back pressure that the valve change at the end of the discharge stroke is delayed.

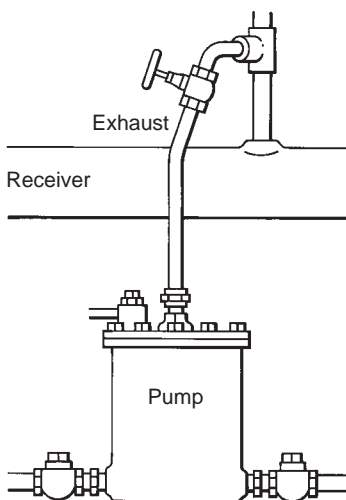


Fig. 5 Correct arrangement of exhaust and vent pipe

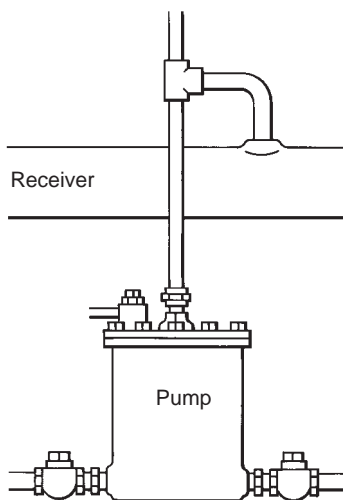


Fig. 6 Incorrect arrangement

Table 1

Pump Size Inches	Receiver capacity minimum		Suggested receiver size using standard piping		Minimum vent pipe size		Recommended overflow pipe size	
	Litres	Gallons			mm	ins	mm	ins
1"	7	1½	0.60 m	24" of 6"	50	2"	40	1½"
1½"	16	3½	0.65 m	26" of 8"	65	2½"	50	2"
2"	24	5½	0.65 m	26" of 10"	80	3"	65	2½"
3"	39	8½	1.10 m	44" of 10"	100	4"	80	3"

11. Check valves

The check valves supplied with the Spirax Ogden automatic pump are of a design specially suited to the operating conditions and should not be replaced with any other type.

a. Inlet The inlet check valve of the 3" pump is fitted with a light spring. This should not, under any circumstances be removed.

b. Outlet Under certain conditions of

operation particularly where the effective lift on the discharge side of the pump is less than 6 m (18 ft) the outlet check valve is fitted with a spring to create sufficient back pressure to operate the pump valve gear.

Where such a spring is fitted it should not be removed and should only be replaced with a spring of similar strength supplied by Spirax-Sarco Ltd. Details of this spring are stamped on the cap of the check valve.

12. Two or more pumps in parallel

Where to meet capacity or stand-by requirements, two or more pumps are used in parallel, they can operate from one common receiver but the receiver must be sized according to the duty.

If, for example, two pumps are used, one of which is capable of handling the maximum load and the second pump is a complete stand-by, then the receiver need be no larger than that required for one pump as shown in Table 1 above .

But if two pumps are used and it is necessary that both shall be in operation at the same time, then the receiver capacity should be twice that required for a single pump.

Fig. 7 shows a suitable layout.

The discharge should preferably be lifted individually from each pump and if necessary joined into a common return line at high level using 'swept' fittings.

If it is necessary to join the discharge lines before lifting, use a twin elbow, never a square tee.

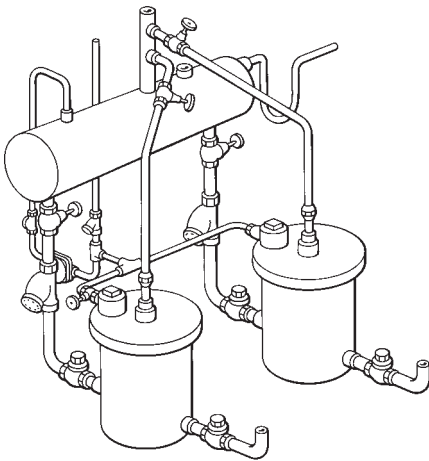


Fig. 7 Typical layout of two pumps in parallel

13. Two or more packaged pump units in parallel

The end of the receiver is provided with a screwed socket which is plugged.

Where to meet capacity or stand by conditions it is desirable to use more than one pump, two or more units can be coupled together through the socket at the end of the receiver.

They can be joined together in various ways to suit the site conditions and space available, as Figs 8, 9 and 10.

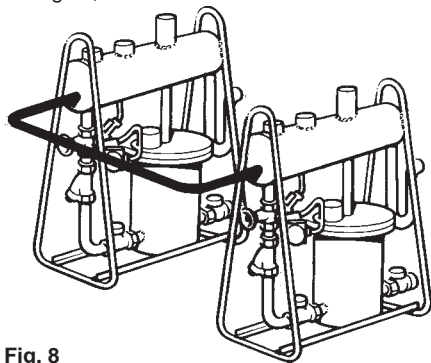


Fig. 8

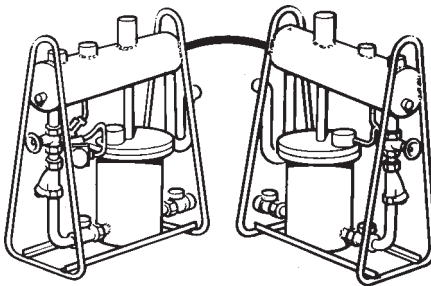


Fig. 9

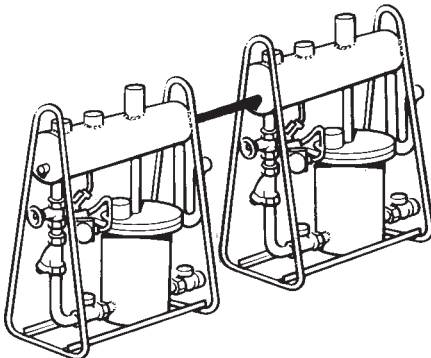


Fig. 10

14. Discharge pipework

The discharge line should never be smaller than the bore of the outlet check valve.

Where a Spirax Ogden pump is used to discharge water over a long distance as with any pump, precautions must be taken to avoid excessive back pressure due to frictional resistance.

The pump cycle is divided between filling time and emptying time so the rate of flow on discharge is something in the region of three times the pump capacity and if calculated under normal conditions, may be assumed to be

1 600 kg/h (3 500 lb/hr)	for a 1" Pump
3 600 kg/h (8 000 lb/hr)	for a 1½" Pump
5 500 kg/h (12 000 lb/hr)	for a 2" Pump
11 000 kg/h (24 000 lb/hr)	for a 3" Pump

Example

Assume a layout as Fig. 11 a 1½" pump discharging over 210 m (700 ft) with a 6 m (20 ft) final lift.

The maximum permissible pressure within the pump body should not exceed 2.1 bar (30 psi) which is equivalent to 21 m (70 ft) head. If the pressure is above this value, the float will be unable to pull the exhaust valve from its seat causing the pump to stop or operate in a noisy harmful manner. If as shown in Fig. 11, 6 m (20 ft) head is absorbed by the final lift, 15 m (50 ft) head remains of which 25 % may be assumed to be available to

overcome pipeline friction.

The total length of line is 210 m (700 ft) to which a minimum of 10 %* should be added to allow for the resistance in fittings, etc. So the available resistance is:

Metric 25 % of 15 m = 3.75 m or 3750 mm
and the travel is:
 $210 + 10 \% = 231 \text{ m}$
So the permissible resistance is:
 $\frac{3750}{231} = 16.2 \text{ mm per metre}$

Imperial 25 % of 50 ft x 12 = 150 in and the travel is:
 $700 + 10 \% = 770 \text{ ft}$
So the permissible resistance is:
 $\frac{150}{770} = 0.19 \text{ inches per foot}$

and for a flowrate of 3 600 kg/h (8 000 lb/hr) any water resistance chart will show that a 2" pipe line is necessary.

Wherever possible aim at putting the lift immediately following the pump with a fall to the terminal point as in Fig. 12 rather than lift at the end of the run as in Fig. 11.

*** Note:** Where numerous changes in direction are involved a higher allowance for the frictional resistance of fittings must be allowed.

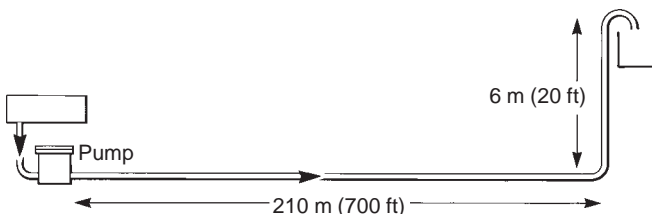


Fig. 11

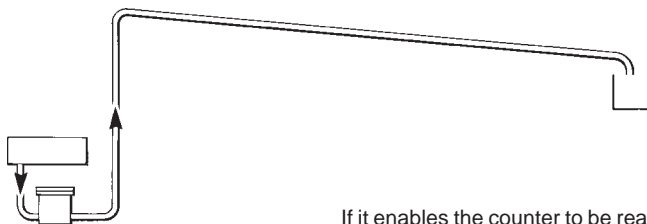


Fig. 12

If it enables the counter to be read more easily its level may be raised by fitting it at the top of a piece of pipe.

An isolating valve can be fitted between the counter and the pump cover.

15. Operation

Having completed the installation, the pump may now be put into operation as follows.

Turn on the operating steam or air supply.

Open the isolating valve on the water inlet to the pump.

Providing that water is available in the receiver the pump should now commence to operate. It will automatically stop and start according to the availability of water.

When shutting down always close the water inlet valve before shutting off the steam or air supply.

It is not advisable to leave the pump with the water inlet valve open at a time when there is no operating steam or air available. To do so may cause flooding of the inlet and exhaust valves and consequent malfunctioning especially on start-up.

16. Flow counter

The Spirax Ogden Automatic Pump delivers a known quantity of water at each stroke. Therefore by counting the strokes over a given period the pump can be used as a simple steam or condensate meter. A key is provided for resetting this counter to zero.

Installation

The top cover of every pump is provided with a hole tapped $\frac{1}{2}$ " BSPT. Remove the plug and attach the counter to the top cover by means of a nipple, as Fig. 13.

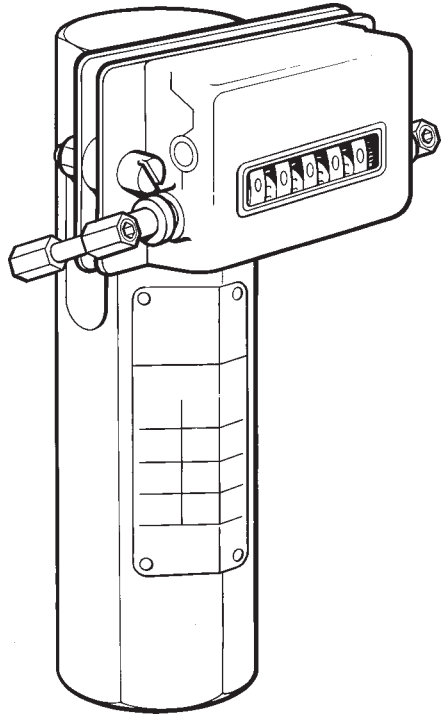


Fig. 13

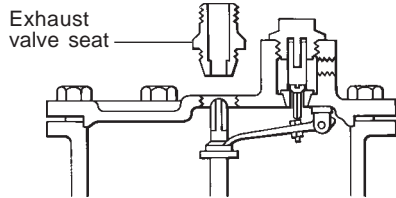
2. Maintenance

Before carrying out any work, ensure that all valves are closed and there is no pressure within the pump body.

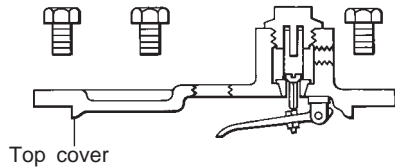
WARNING: Do not, in any circumstances, attempt to remove the top cover of the pump without first of all removing the exhaust valve seat as you may damage the internal operating mechanism.

17. Setting the valves

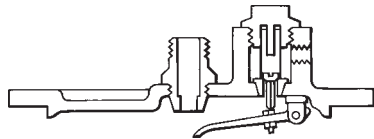
- a. Before attempting to remove the top cover, unscrew the exhaust valve seat.



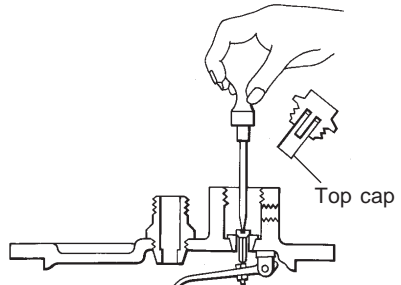
- b. Undo bolts and lift off top cover.



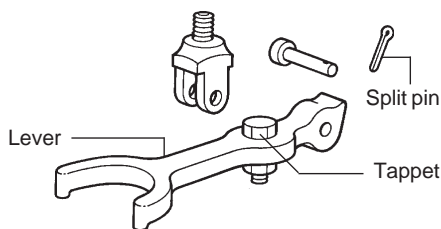
- c. Replace the exhaust valve seat.



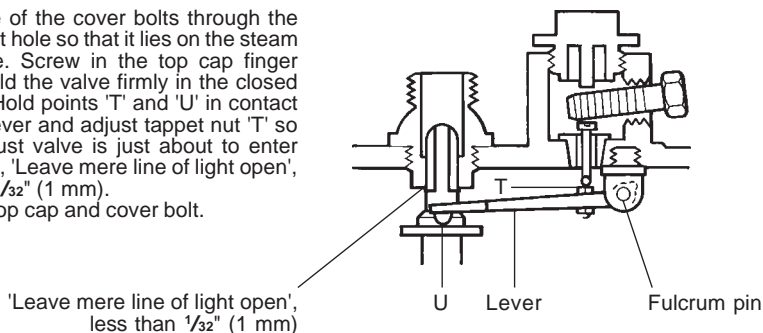
- d. Unscrew top cap, examine steam inlet valve and grind in with fine paste or metal polish if necessary.



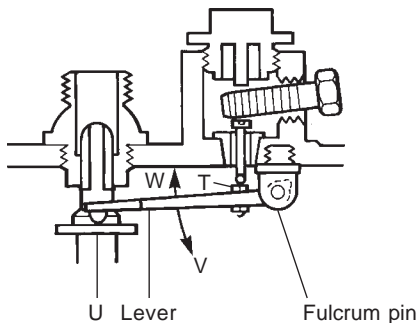
- e. Remove the fulcrum pin by extracting the split pin and examine the lever. If the tappet face is worn it can be refaced or replaced. Replace the lever.



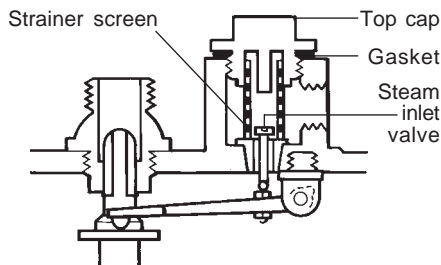
- f. Insert one of the cover bolts through the steam inlet hole so that it lies on the steam inlet valve. Screw in the top cap finger tight to hold the valve firmly in the closed position. Hold points 'T' and 'U' in contact with the lever and adjust tappet nut 'T' so that exhaust valve is just about to enter valve seat, 'Leave mere line of light open', less than $\frac{1}{32}$ " (1 mm). Remove top cap and cover bolt.



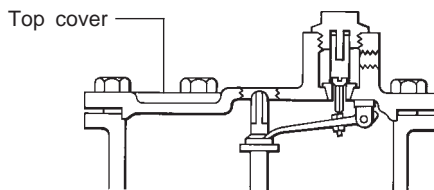
- g. If to achieve this setting it is required to move the lever towards V or W, then with the Mark III type of lever, adjustment can be made simply by altering the position of the screwed tappet taking care to tighten up the lock nut afterwards. To set the older type Mark I lever it must be bent to suit. Do not attempt to bend this in position, always remove it from the fulcrum, hold in a vice and using a hammer, tap gently. When the correct setting has been obtained, ensure that the split pin is replaced in the fulcrum pin.



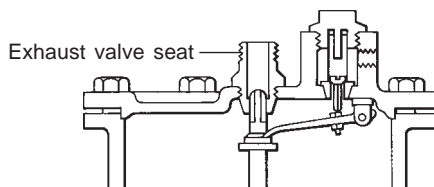
- h. Fit top cap, strainer screen and gasket. Torque tighten top cap to 75 / 80 N m



-
- i. Remove exhaust valve seat. Replace top cover tightening all bolts to distribute tension evenly.
If the old cover gasket is in bad condition thoroughly clean off and use a new gasket.



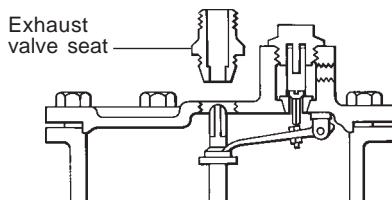
-
- j. Replace exhaust valve seat using a little grease to assist in making a steam tight joint.
Under no circumstances should a gasket or other jointing material be used otherwise the setting will be altered.



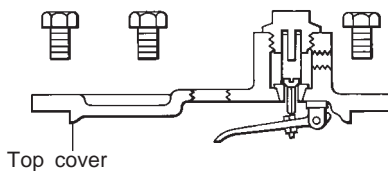
18. Fitting new steam inlet valve and seat

A new steam inlet valve and seat is always supplied with a new top cap, as a packaged unit. The existing top cap should not be used as it may be too short to hold the valve seat properly in position.

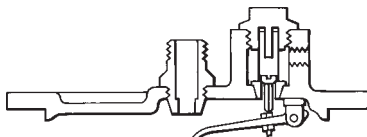
- a.** Before attempting to do this, unscrew the exhaust valve seat.



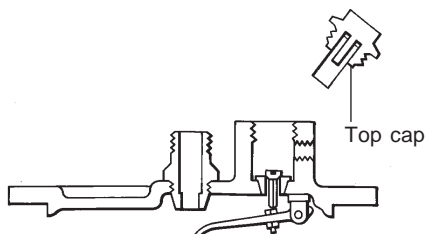
- b.** Undo bolts and lift off top cover.



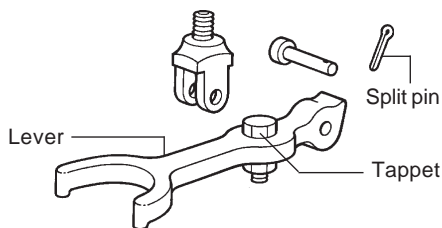
- c.** Replace the exhaust valve seat.



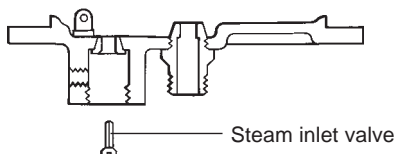
- d.** Unscrew top cap.



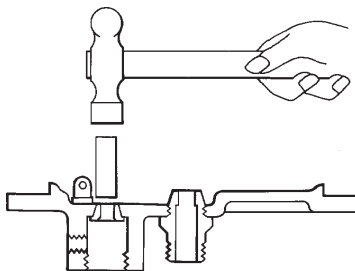
- e.** Remove the fulcrum pin by extracting the split pin and examine the lever. If the tappet face is worn it can be refaced or replaced.



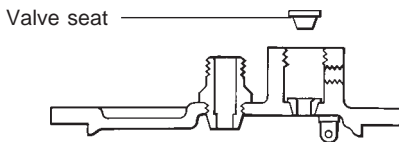
- f.** Turn cover over — the steam inlet valve will fall out.



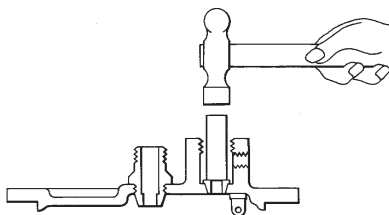
- g.** Remove valve seat by tapping with hammer and metal drift.



- h.** Turn cover over. Make sure that the hole in cover and valve seat are clean. Add loctite 243 to the conical surface of the seat

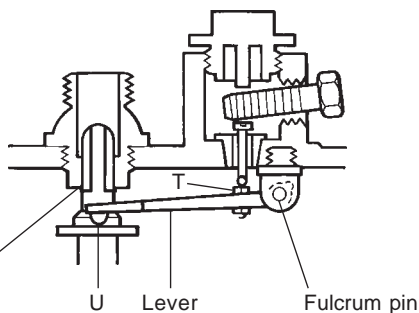


- i.** Using a drift of wood or soft metal, tap valve seat into position to ensure tight fit.

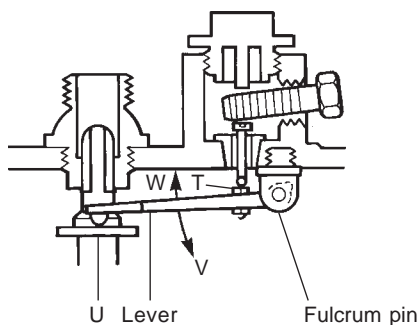


- j.** Drop in new valve. Insert one of the cover bolts through the steam inlet hole so that it lies on the steam inlet valve. Screw in the top cap finger tight to hold the valve firmly in the closed position. Hold points 'T' and 'U' in contact with the lever and adjust tappet nut 'T' so that exhaust valve is just about to enter valve seat, 'Leave mere line of light open', less than $\frac{1}{32}$ " (1 mm) Remove top cap and cover bolt.

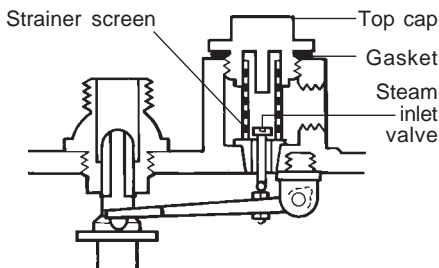
'Leave mere line of light open',
less than $\frac{1}{32}$ " (1 mm)



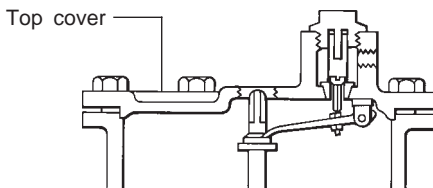
- k.** If to achieve this setting it is required to move the lever towards V or W, then with the Mark III type of lever, adjustment can be made simply by altering the position of the screwed tappet taking care to tighten up the lock nut afterwards.
To set the older type Mark I lever it must be bent to suit. Do not attempt to bend this in position, always remove it from the fulcrum, hold in a vice and using a hammer, tap gently. When the correct setting has been obtained, ensure that the split pin is replaced in the fulcrum pin.



- l.** Fit top cap, strainer screen and gasket. Torque tighten top cap to 75 / 80 N m

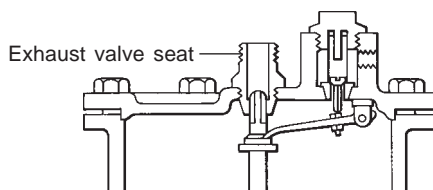


- m.** Remove exhaust valve seat. Replace top cover tightening all bolts to distribute tension evenly.
If the old cover gasket is in bad condition thoroughly clean off and use a new gasket.



-
- n. Replace exhaust valve seat using a little grease to assist in making a steam tight joint.

Under no circumstances should a gasket or other jointing material be used otherwise the setting will be altered.



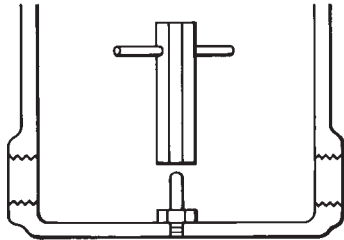
19. Fitting new guide peg

Open up pump by following steps 17a and 17b, then proceed as follows:-

- a. Remove exhaust valve set. The guide peg can usually be withdrawn by using a box spanner on the hexagon nut but it may be necessary to remove the burr at the end of the thread.



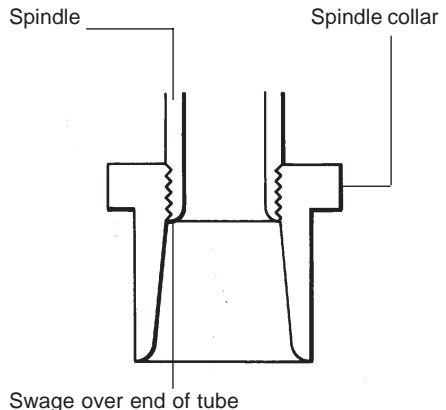
- b. Screw the new guide peg into position from inside the pump body with a 27 mm A/F box spanner and tighten down into place. Turn the body over, trim off any surplus metal and lightly burr over the end.
- c. Replace exhaust valve set by following steps 17i and 17j.

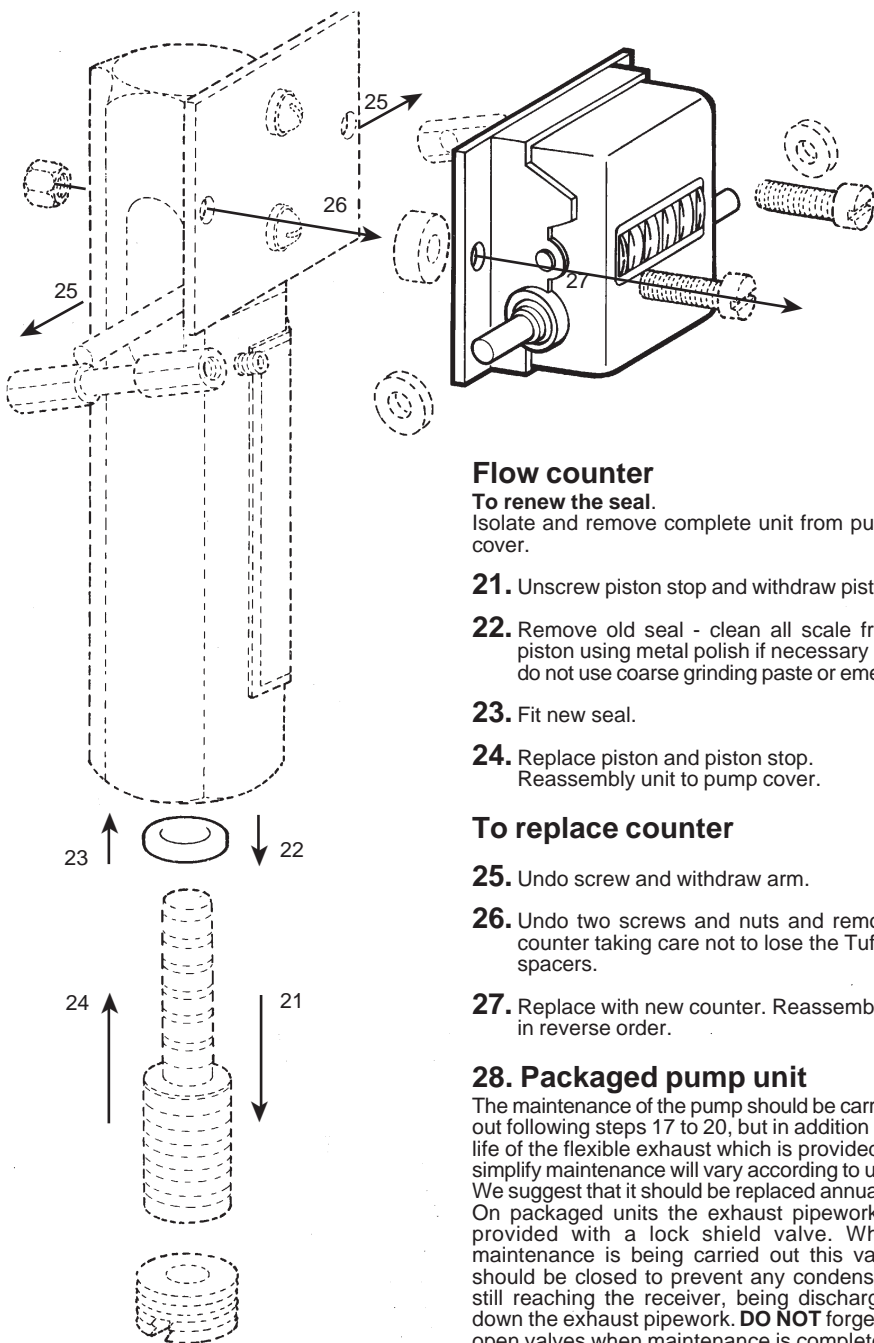


20. Fitting new exhaust valve and seat

Open up pump by following steps 17a and 17b, then proceed as follows:-

- a. The exhaust valve assembly complete with float may now be lifted out of the pump body.
- b. Note that the top of the float is marked TOP. Unscrew the bottom collar and remove the float.
- c. Transfer the float to spindle of new exhaust valve assembly and fit bottom collar. **It is important that the float is fitted onto the spindle with the face marked 'Top' uppermost.**
- d. Tighten the collar onto the end of the spindle and swage over the end of the spindle tube. Reassemble by following steps 17d to 17j.





Flow counter

To renew the seal.

Isolate and remove complete unit from pump cover.

21. Unscrew piston stop and withdraw piston.

22. Remove old seal - clean all scale from piston using metal polish if necessary but do not use coarse grinding paste or emery.

23. Fit new seal.

24. Replace piston and piston stop.
Reassembly unit to pump cover.

To replace counter

25. Undo screw and withdraw arm.

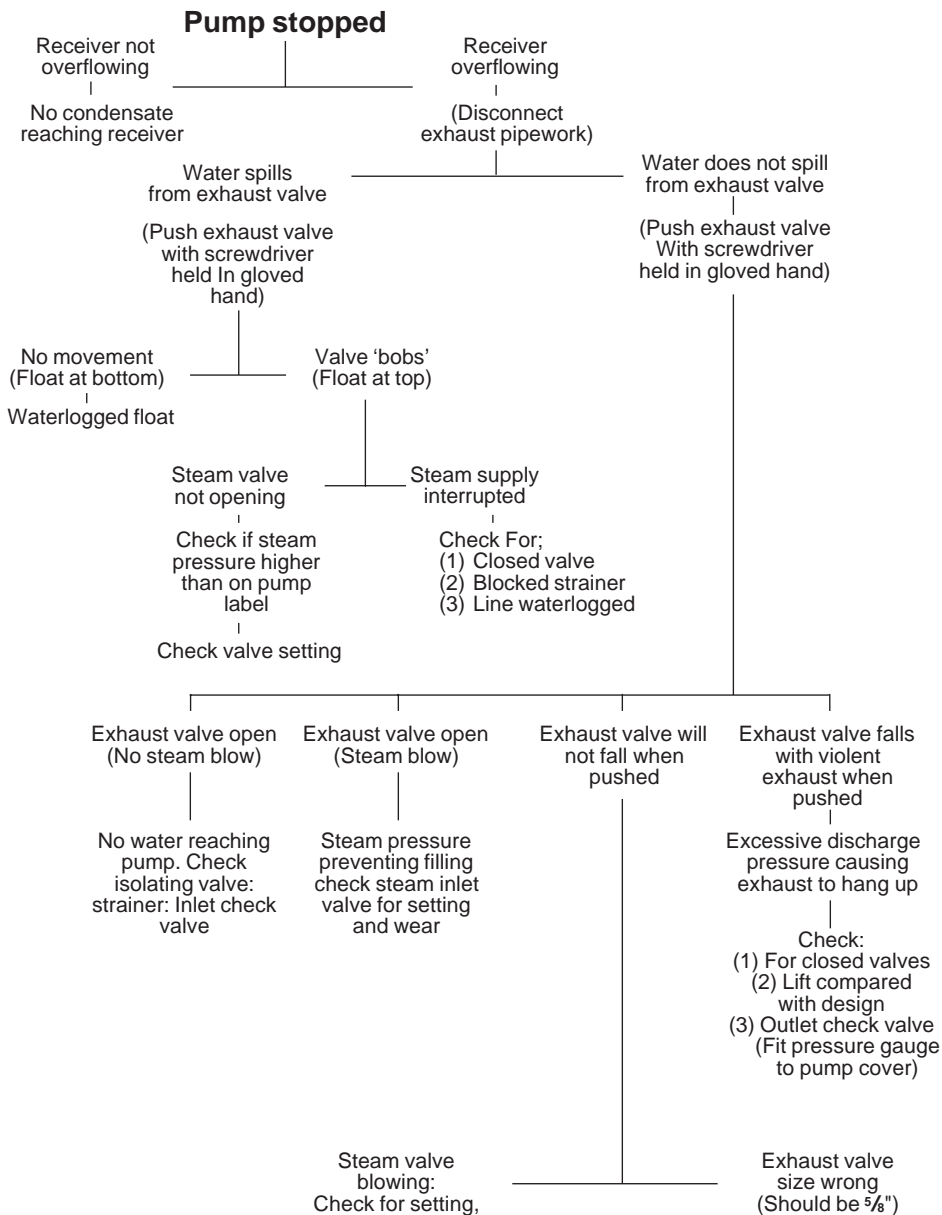
26. Undo two screws and nuts and remove counter taking care not to lose the Tufnol spacers.

27. Replace with new counter. Reassemble in reverse order.

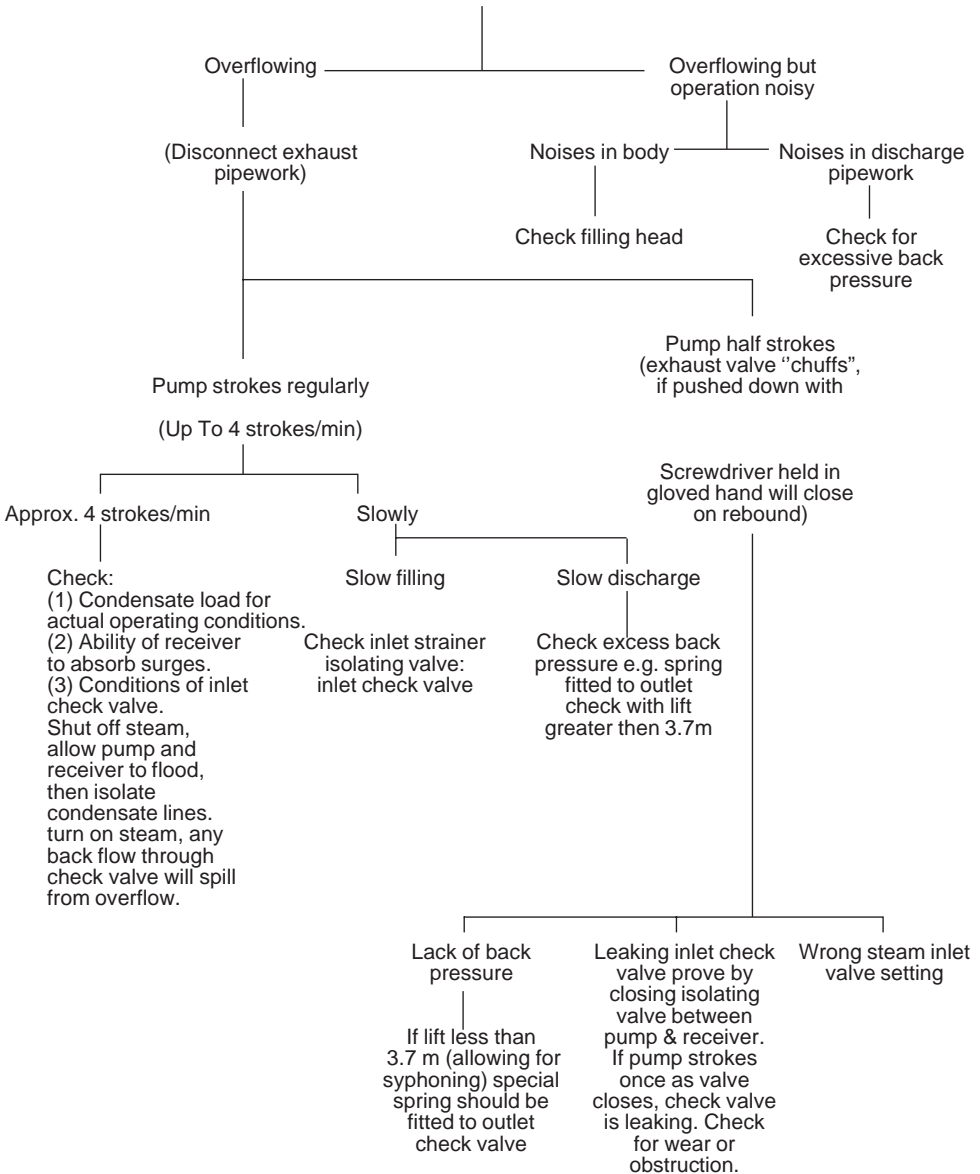
28. Packaged pump unit

The maintenance of the pump should be carried out following steps 17 to 20, but in addition the life of the flexible exhaust which is provided to simplify maintenance will vary according to use. We suggest that it should be replaced annually. On packaged units the exhaust pipework is provided with a lock shield valve. When maintenance is being carried out this valve should be closed to prevent any condensate still reaching the receiver, being discharged down the exhaust pipework. **DO NOT** forget to open valves when maintenance is complete.

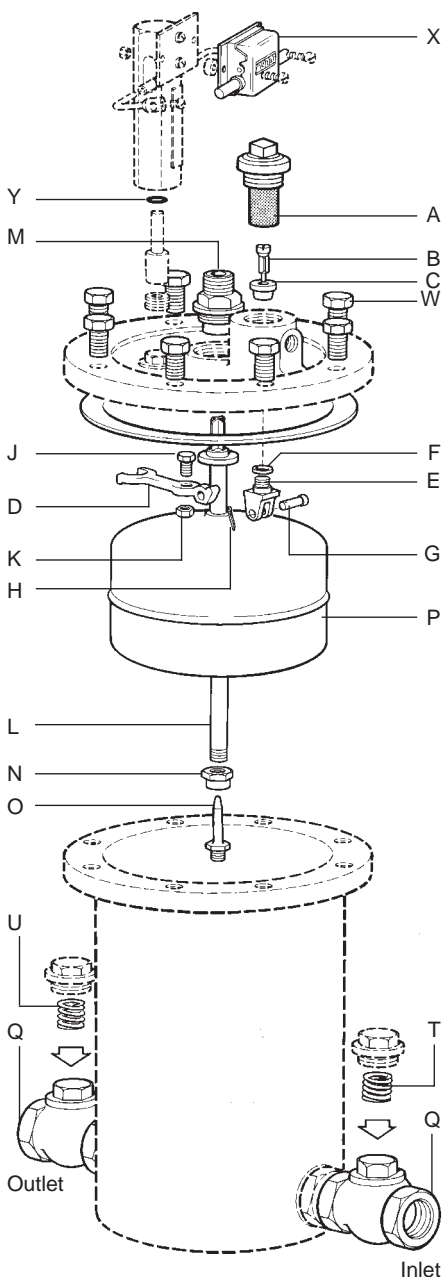
3. Trouble tracing



Pump not stopped



4. Available spares



The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares.

AVAILABLE SPARE

Pump

Steam inlet valve assembly	A, B, C
Top cap (Included in complete steam inlet assembly)	A
Lever, fulcrum and pin assembly	D, E, F, G, H, J, K
Tappet and locknut (Included in complete lever, fulcrum and pin assembly)	J, K
Exhaust valve set	L, M, N
Guide peg	O
Float	P
Cover gasket	V (Pkt of 3)
Set of cover bolts	W (Set of 8)
Inlet check valve	Q
T (fitted on 3" valves only)	T
Inlet check valve spring (3" size only)	T
Outlet check valve	Q
Outlet check valve Spring (only required in certain application)	U

Flow counter

Counter unit	X
Seal (packet of 3)	Y

Packaged unit

Flexible exhaust and clips (not illustrated)	
--	--

How to order

Always order spares by using the description given in the column headed Available Spare and stating the size and type of pump.

Example: 1 - Exhaust valve set for size 2" Spirax Ogden automatic pump.

5. Special application

The Spirax Ogden automatic pump is sometimes used for purposes other than condensate pumping.

Two examples are shown in the following:

29. Draining direct from a vessel under pressure or vacuum

It is very important that only the special pumps supplied are used in such duties and that they are installed strictly in accordance with any specific details supplied in connection with the application.

In general, when draining direct from a vessel under pressure or vacuum the pump should be arranged as Fig. 14 with the exhaust pipe acting as a pressure balance pipe and connected back into the vessel being drained.

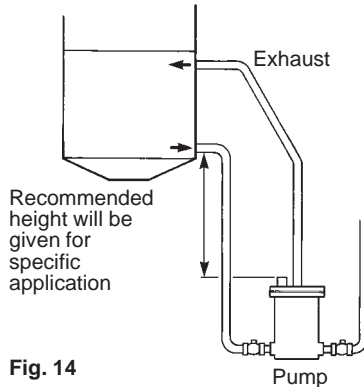


Fig. 14

30. Exhaust or balance pipe

It is particularly important under vacuum conditions to see that all the joints especially in the balance pipe, are tight. Unnecessary jointing can be avoided by making up the balance pipe in 1" pipe bending to suit the plant layout.

31. Steam supply

When draining from vacuum and using steam as the operating medium, only dry saturated steam should be used and at a pressure not exceeding 3 bar (40 / 50 psi).

Whilst so far as operating the pump is concerned compressed air would be an ideal medium, it is usually avoided because the air would be exhausted into the vessel being drained.

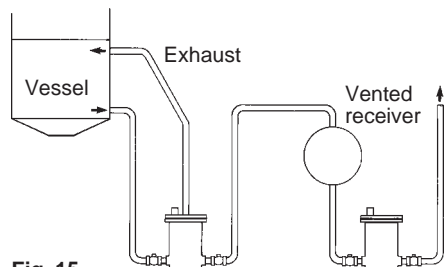


Fig. 15

32. Condensate lifting

It is seldom possible to use an Ogden Pump to combine the duties of draining from vacuum and lifting the condensate. Where this is necessary the problem can sometimes be overcome by using two pumps as Fig. 15.

Where the pump is being used as a vacuum drain unit and there is no lift, the discharge should be arranged as shown in Fig. 16 so that the check valve is always water sealed to prevent air leakage into the vacuum space.

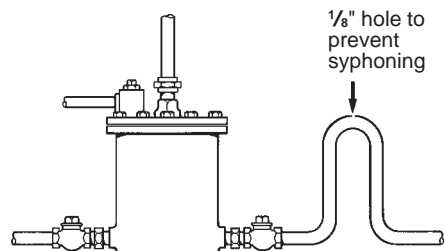


Fig. 16

33. Lifting water from a pit, sump or reservoir

In this application the pump can be usefully employed to keep the upper part of the pit clear of water and thus prevent overflowing. It cannot drain the pit below the top of the pump.

34. Operating medium

Because the pump as in Fig. 17 is submerged and surrounded by cold water it is important that compressed air and not steam is used as the operating medium.

If steam is the only available operating medium then the pump should be installed in a tank as in Fig. 18 so that the cold water cannot come into contact with the outside of the pump body.

35. Water inlet

A strainer should be fitted to the water inlet which should be extended upwards as is shown in Figs. 17 and 18. In this way the water inlet will be diverted away from the sludge which usually collects in the bottom of the pit and which could cause excessive fouling of the strainer.

36. Servicing

To facilitate the removal of the pump for servicing, unions should be provided in the pipelines above the top of the pit.

37. Exhaust

When using steam as the operating medium as in Fig. 18 it may not be practical or hygienic to discharge the exhaust into the pit as shown. It is most important that the exhaust discharges to a safe place.

The steam trap discharge should preferably be connected into a nearby condensate return line.

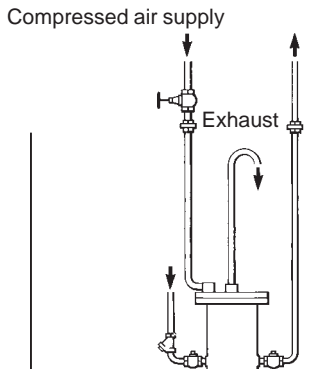


Fig. 17

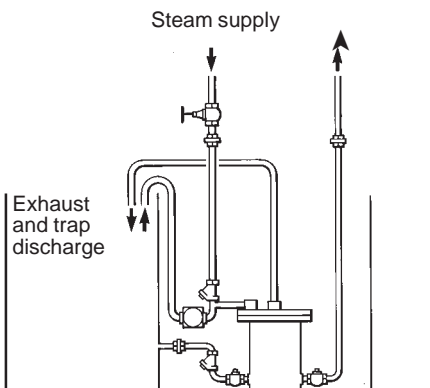


Fig. 18

