and apply the glue to the area to be covered by the patch. Allow this to dry until the glue no longer feels tacky. Apply the patch and press it down well, then apply a weight over a flat object placed on the repaired area. Leave it for a while. Remove the weight and the flat object. The patch should have stuck.

Other operating tables are of the hydraulic type, movement being achieved by pumping a pedal to move the parts hydraulically, as with a car jack. With these tables the hydraulic oil is likely to leak when the seals around the pistons become worn or perished. Although it may be possible to pump the table up, it may not stay at the required level. This is caused by a leak in the release mechanism, allowing oil to seep back. A motor mechanic who repairs hydraulic jacks may be able to help in solving this problem, and may even have seals that will fit the table. The hydraulic oil will certainly be similar. Alternatively, contact the manufacturer of the operating table. A label giving the manufacturer's name and address is likely to be on the table. Explain the problem and ask for advice in resolving it. Ask for a service manual at the same time.

It is important to remember that hydraulic tables can be repaired without expensive spares, even if it means resorting to the motor trade.

Suction apparatus

The usual atmospheric pressure used for calibration is 760 mmHg (100 kPa or 14.7 psi), which is the standard at sea level. Negative pressure is any pressure that is less than atmospheric, or zero, on the pressure gauge. A vacuum force can thus be described as a negative pressure; suction is the application of that negative pressure, and relates to the movement of gas, fluids, or solids so caused.

Negative pressure can be measured by the amount of vacuum force acting on a given area to lift liquid up a column to a given height. It is generally measured as the height of either mercury or water in inches, centimetres, or millimetres. Mercury and water pressure levels may be marked on the same gauge. A water column, being 13.6 times longer than that of mercury to support the same pressure, is more sensitive. Therefore gauges calibrated with a water column generally cover a smaller range of pressures than those calibrated with a mercury column. A negative pressure equal to 1 mmHg means the amount of vacuum required to lift mercury up a column by 1 millimetre. The same negative pressure will lift water up a column to a height of 13.6 millimetres.

The four main types of suction machine used in hospital practice are described below.

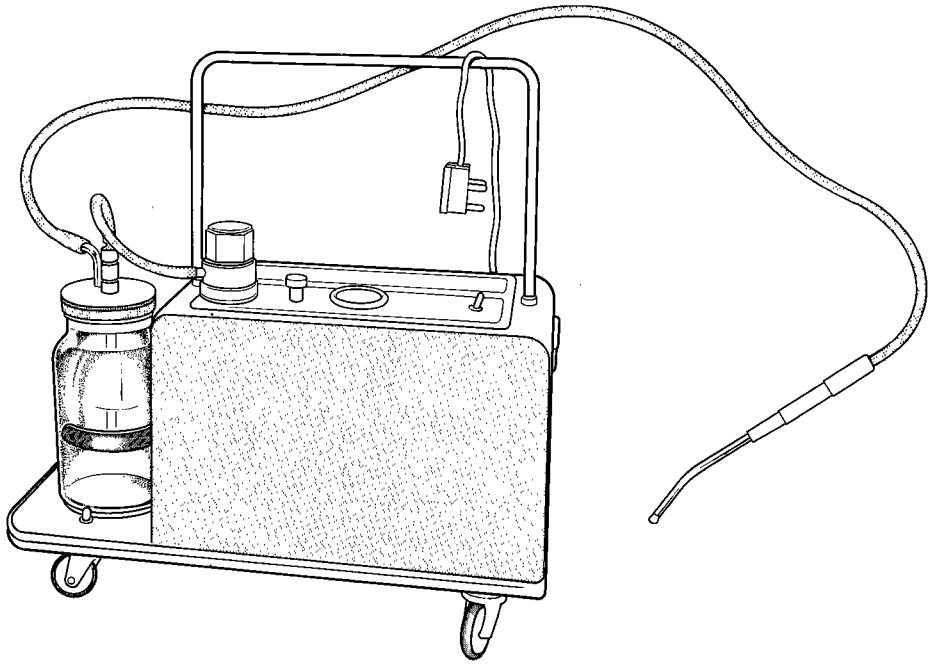
The electric suction machine

This machine has an electric pump which evacuates a bottle (reservoir), to which is attached a suction tube (Fig. 5.1). The system incorporates a pressure gauge and a mechanism to facilitate regulation of the vacuum, by allowing air to be drawn in from the room.

Wall-supplied suction

This normally works in the same way as the electric suction machine, the difference being that the motor generating the suction is some way away, and is connected to several outlets. This type of suction therefore requires a much larger reservoir since more than one outlet may be in use at one time. The wall suction equipment

Fig. 5.1. Electric suction machine.



includes a large tank that is evacuated by a pump and to which the suction line is connected. The tank is fitted with a pressure switch that automatically turns on the pump if the vacuum falls below a certain level.

Most suction equipment has a device for regulating the level of vacuum, such as a simple bleed-off screw, or a spring-operated device, that keeps the vacuum at the set level. The wall suction systems often have high and low settings, the latter often being used for infants and children. Modern systems are calibrated in kPa (kilopascals); a low vacuum is up to about 30 kPa, and a high vacuum may be up to about 100 kPa. Other units such as mmHg may be found. Conversion factors for many of these are given in Annex 4.

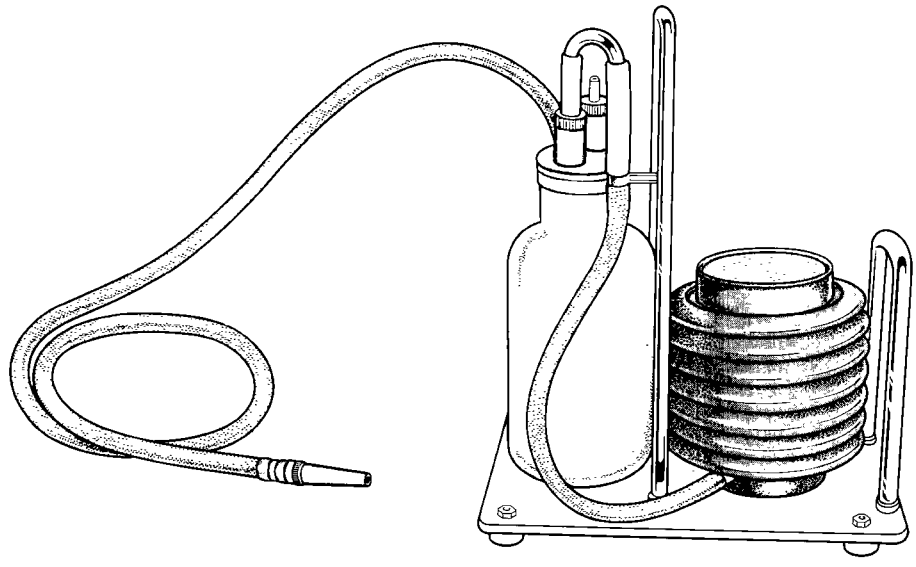
Foot-operated suction unit

This is the simplest type of suction unit and is operated by pressing on a piston with the foot (Fig. 5.2). On the return stroke of the piston (operated by a spring), suction is created, and a series of valves directs the flow as required. The maintenance of such a suction unit is fairly simple and often only involves making sure that the one-way valves are working correctly, and that there are no leaks in the system.

Piston pumps

These suction pumps have two pistons that are operated by an induction motor, with each piston sucking in turn. The suction line is taken from a bottle connected to the unit, which incorporates a pressure gauge and a pressure-relief valve, so that it can be regulated to the desired pressure. These pumps have only a small capacity, and are used mainly for drainage during surgery. Maintenance involves keeping the unit well oiled; if this is not done, the pump will stop or operate very slowly.

Fig. 5.2. Foot-operated suction machine.



Maintenance and repair

To avoid the possibility of infection, make sure that the machine has been sterilized before starting to work on it; do not put any parts in your mouth, and wash your hands afterwards. **Do not** suck or blow into any part of the machine, and handle all parts with care. Cover any cuts or abrasions, and wear a pair of gloves.

Maintenance of suction systems is for the most part not difficult. The commonly used colour code for a vacuum hose is yellow. Get to know the level of suction to be expected from a unit. Lower levels will indicate a problem somewhere in the system. The most common problem is a leak, which may be in the tubes or inside the machine. It may be that the bottle is not screwed in place properly. Check the sealing washer, and check that the bottle itself is not cracked. To check the bottle and its tubing, remove the tubing where it comes out from the machine and put a finger over the end with the machine turned on. The pressure gauge should go to its maximum. If it does not, then there is a problem inside the machine itself. If it does, the problem is with the bottle or the tubes.

If the problem appears to be inside the machine, take off the covers. If the tubing is not at fault and is tight on the connectors, and if the pressure gauge is working properly, then the fault must lie with the motor. Dismantle the motor in an attempt to locate the problem. A likely cause is a hole in the rubber diaphragm (if it is a diaphragm pump).

If a high vacuum is recorded on the gauge with none at the suction tube, this is usually caused by a blockage in the system.

Surgical diathermy machine

In surgical diathermy, a high-frequency electric current (0.5–2 MHz) is used to produce heat to seal (by coagulation) blood vessels, or to cut and seal at the same time. The heating can be regulated by a variable resistance.

There are two types of diathermy machine: monopolar and bipolar.

In monopolar machines, the current flows from the active electrode through body tissue, along the line of least resistance, to a large indifferent plate electrode and