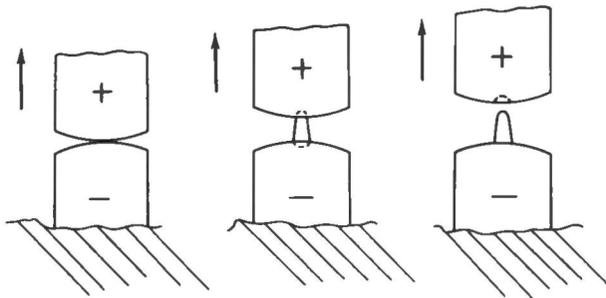


**Non-Arcing Systems.** When voltages and currents are at sufficiently low levels, arcing will not occur. Two electrical contact members approaching each other will first touch at the mating of two asperities and initially the full source voltage appears across this a-spot. If the source voltage is high enough, softening or melting of the tiny spot will occur. Microscopically this can occur despite the presence of current limiting resistors in the circuit. At the very first instant of touching, the a-spot is so small that almost all of the source voltage appears across it. Consequently, the temperature that can exist momentarily in the a-spot is controlled by the source voltage.

Beyond the first microscopic touching, as deformation of the members increases, micro-welding takes place at the asperities, again assuming clean contact members.

Having been fully engaged with micro-welds existing, the contacts will now be separated. In the separating process the a-spots gradually decrease in area and an increase in resistance and temperature follows as a result of this change in area. When the melting voltage of the material appears across the interface, a liquid is formed which is then drawn out by surface tension with further separation. It happens, with both members of the same material, that the anode is hotter than the cathode. Material near the cathode thus cools first and final rupture of the liquid leaves a build-up of material on the cathode. Fig. 1-10 pictures the sequence of events in separating contacts. The material transfer just described is called *bridge transfer*. With identical mating members, the cathode always gains material; however, the direction can be controlled by using different materials for anode and cathode. The magnitude of bridge transfer on breaking contact is approximately proportional to the square of the rupture current for currents over two amperes and roughly proportional to the cube of the rupture current for values under two amperes.



**Fig. 1-10.** Representation of bridge transfer in parting contacts.