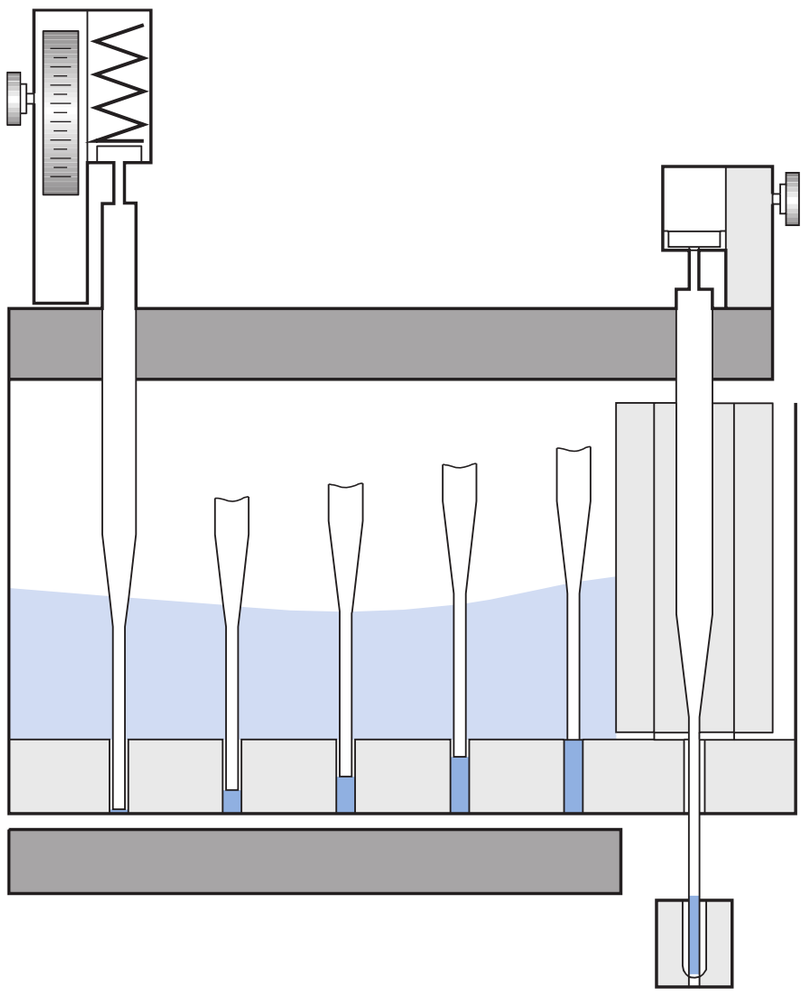

Fig. 33.4 • A dosing disc and tamping finger machine, Höfliger & Karg. (Courtesy of Jones 2007, with permission.)

(Fig. 33.4). This disc has several sets of accurately drilled holes in which powder plugs are formed by several sets of tamping fingers – stainless steel rods that are lowered into them through the bed of powder. At each position the fingers compress the material in the holes, building up a plug before they index on to the next position. As the disc rotates, material flows into the holes. At the last position, fingers push the plugs through the disc into capsule bodies. The powder fill weight can be varied by the amount of insertion of the fingers into the disc, by changing the thickness of the dosing disc, and by adjusting the amount of powder in the hopper.

The machines that use this system are all intermittent in motion. Examples are manufactured by Robert Bosch, Harro Höfliger, PAM machinery and Qualicaps.

Instrumented capsule-filling machines and simulators

Unlike tablet machines, few workers have instrumented capsule-filling machines. This is for a variety of reasons. Capsules are used only in the pharmaceutical and health food industries, as opposed to tablets, which are widely used by many other industries and therefore there is more incentive to do fundamental research. The tablet press is simple to quantify: there are two punches and a die that holds a specific volume of material. On a capsule-filling machine there are a variety of moving parts involved in dosing, which occurs in an unconfined bed of powder. The forces involved are small. As a result of this, comparatively few papers have been published on the topic. Dosator machines have been studied the most. Strain gauges have been fixed to the piston and have enabled the compression forces (10–250 N) and ejection forces (1–20 N) in lubricated products to be measured. Distance transducers have been used to measure the relative movements of the piston and dosator. Simulators have also been built to overcome the problem of the machine parts moving but to date, these have had limited application (Armstrong 2004).

Pellet filling

Preparations formulated to give modified-release patterns are often produced as granules or coated pellets. They are filled on an industrial scale using machines adapted from powder use. All have a dosing system based on a chamber with a volume that can easily be changed. Pellets are not compressed in the process and may have to be held inside the measuring devices by mechanical means, e.g. by applying suction to the dosing tube. In calculating the weight of particles that can be filled into a capsule, it is necessary to make an allowance for their size. Unlike powders, which have a much smaller size, they cannot fill as much of the available space within the capsule because of packing restrictions. The degree of this effect will be greater the smaller the capsule size and the larger the particle diameter.

Tablet filling

Tablets are placed in hoppers and allowed to fall down tubes, at the bottom of which is a gate device that will allow a set number of tablets to pass. These fall by gravity into the capsule bodies as they pass underneath the hopper. Most machines have a mechanical probe that is inserted into the capsule to check that the correct number of tablets has been transferred. Tablets for capsule filling are normally film coated to prevent dust generation, and are sized so that they can fall freely into the capsule body but without turning on their sides. A recent innovation is the filling of coated minitablets, which have a