8 Bowl Discharge Systems

8.1 Introduction

There are various ways to discharge a mixing bowl and these are dependent on the size of bowl and the product behaviour.

In most cases mixing units with bowl capacities of up to 40 ltr. are manually discharged. For Herbst Planetary Mixing units of the series HR 15 to HR 120 a tilting bowl can be provided if so required; the bowl would then be emptied by loosening the fixing toggles, tilting the bowl forwards and allowing the product to flow over a nozzle spout into the desired container. With paste like products a manual emptying assistance by means of scrapers etc. may be required.

Special tilting devices for manual or hydraulic operations are available for the bowl discharging operation.

In case of an automatic discharge system the flow behaviour of the product plays a substantial role in selecting a discharge device.

As a rule a product pump is employed for free flowing products; it is also possible to use compressed air or a vacuum for this type of product.

The discharge of high viscous products becomes more difficult and usually a special bowl discharge system, based on the product characteristics, is installed.

8.2 Product Pumps

To be supplemented, please ask for a new CD-ROM version.

8.3 Bowl Discharge Systems for high viscous Products

Discharging highly viscous products from a mixing bowl often presents a problem that cannot be solved with standard pumps. In such cases discharge systems, specially designed for the medium to be stirred are used, taking into account the individual properties of the product, such as viscosity and flowability. Examples here are high viscosity adhesives, lubricants, ceramic masses, pastes, creams and sealing compounds.

An evacuation piston is often the only practical way to discharge the bowl residue-free. In this case the product is discharged via a bottom outlet valve or a pipe. The piston moves hydraulically, electrically or pneumatically.

The material of the piston is mostly stainless steel or Teflon. The exact adjustment of the piston to the bowl ensures an almost residue-free discharge. In order to keep the forces as low as possible when withdrawing the piston, compressed air can be added via bores. Alternatively, an operation with a piston covered with a plastic foil is possible. The foil prevents the product from sticking to the container wall and also makes cleaning of the piston unnecessary.

Figure 78 shows a bowl discharge station for emptying 7 and 15 litre bowls, to the right a suitable transportation device eases bowl handling.

Figure 78: Bowl Discharge System HBE 7-15

The following system has been developed to allow the discharging of mixing bowls of 7 to 60 liters capacity of products which require to be absolute free of any air inclusion, i.e. air bubbles etc.. To achieve that, the operation is to be carried out under vacuum. See illustration 79.

Figure 79: Vacuum-Emptying System HBEV 7-60

The system is fitted with two independent hydraulic cylinders, one for the operation of the vacuum hood and the other for the discharging piston. Adaptors are available for the various bowl and piston sizes. The vacuum pump is in operation throughout the duration of the discharging operation to prevent the formation of an air cushion between the discharging piston and the product surface.

Figure 80 shows a discharge system for sealing masses which is combined with a system to take over the bowl from the mixer and put it underneath the evacuation piston. This process is electronically controlled and monitored.

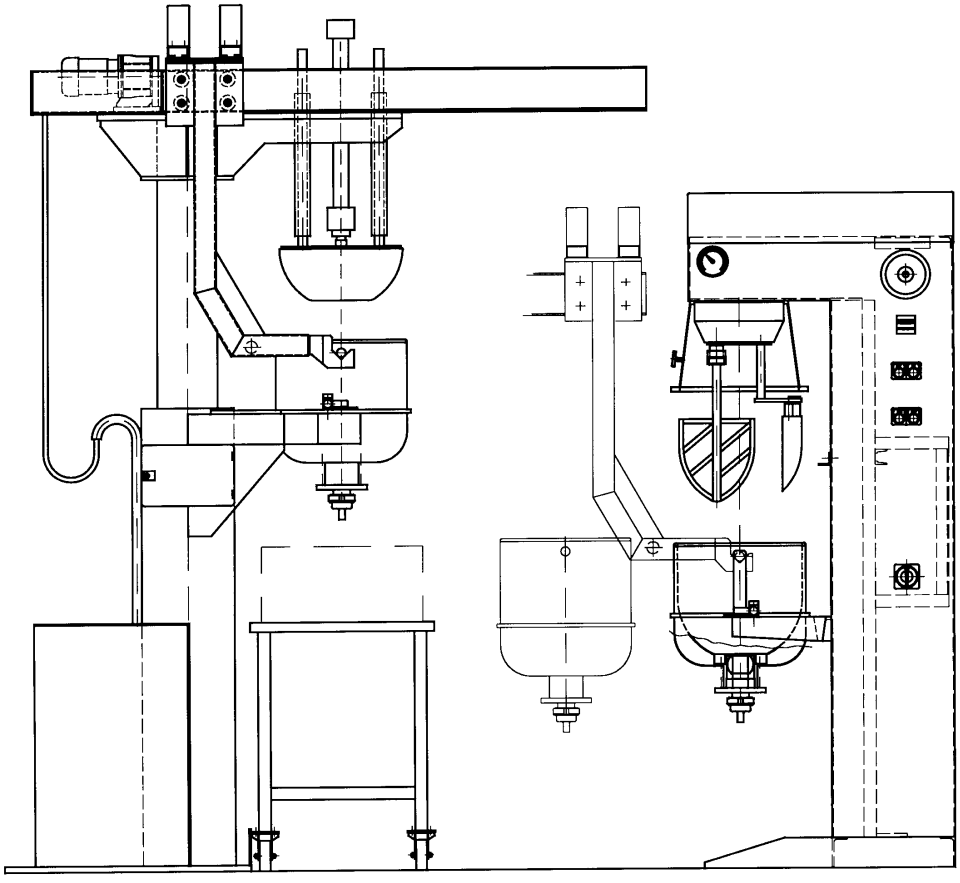

Figure 80: Discharge System HBE 40

Figure 81 shows a mobile discharging station. The discharge plug together with the support column is electro-hydraulically operated thereby reducing the head room and enabling access through low doorways.

Figure 81: Mobile Bowl Discharge System HBE-M 120

Illustration 82 shows pivoting Bowl Discharge System without the enclosure around the drive unit.

For discharging the mixing bowl is placed beneath the drive unit and fastened together with retaining clamps, the complete unit is then lifted with the hydraulic operated telescopic cylinder thus allowing access to the bottom discharge valve and enabling the total bowl contents to be discharged into an appropriate container. The lateral movement is affected by the gear motor located on the gear ring mounted on the base plate.

The discharge plug operated by the small hydraulic cylinder located inside the mixing

Figure 82: Pivoting Bowl Discharge System HBE 150 SC

bowl is used to force the product out through the bottom discharge valve which needs to be open prior to the start of this operation.

A planetary mixer HR-S 200 in combination with a bowl discharge system HBE 200 can be seen in Figure 83. Highly temperature resistant fire proofing compound are being produced in the planetary mixer. A fork lift places the full mixing bowl into the discharge station where it is emptied into smaller units by means of a hydraulically operated Polyamide discharge piston.

Generally the discharge systems are made of stainless steel and complete with the respective control technique. The electrical equipment varies from a simple manual control to a full electronical control. A combination with a tandem-arranged filling machine is possible.

The construction of the machine complies of course to the safety standards. Ex-proof construction (ATEX 94/9) can be delivered as well.

Figure 83: Bowl Discharge System HBE 200

There are a number of drum emptying system for use with high viscous /paste products on the open market which provide a simple method by the use of an air pressure operated plug. This method is only interesting when the product is being transferred from the bowl to a drum for temporary storage and the thereby arising cost and time loss have shown not to be economical in relation to the use of the above described system offered by Herbst.

8.4 Evacuation Piston

Discharging manually is time consuming and an external discharging unit requires additional high investments which often does not pay with small quantities.

Nowadays a less costly alternative for sufficiently easyflowing products, i. e. creams is to use the hydraulics of the planetary mixer. There are suitable planetary mixers in construction sizes of 7 to 15 litre bowl volume. All machines have in common that the bowl can be lifted and lowered by means of a hydraulic system. After replacing the

stirring tools by a suitable discharge piston it is possible to discharge the bowl via the open bottom outlet valve during the hydraulic lifting.

A further advantage in cream manufacture is the fact that the various phases, such as the melting of the fatty phase, the emulsification with the help of the rotor-stator-system, the cooling cycle down to discharging can be done in one machine with the use of the planetary mixer. Time and product losses caused by an additional transfer cycle can be avoided as well as costs for an external discharge unit and less cleaning efforts are necessary. Combining the machine with a program control system would optimise the whole process.

Figure 84 shows a 15 litre planetary mixer fitted with a discharge piston fabricated, in this case, of stainless steel, however, it can also be fabricated from other materials i. e. Polyamide etc. The piston is shaped to suit the contours of the mixing bowl which provides a near enough complete product discharge.

Figure 84: Planetary Mixer HRV 15 fitted with Discharge Piston

Small sized bowls permit the use of manually operated discharge plugs by means of a screw spindle to provide the necessary forward movement (see page 81).

8.5 Bowl Tilting Device

A simple, manually operated, tilting device is shown in Figure 85. To provide a safe bowl

Figure 85: Bowl Tilting Device with manual control

discharging operation the tilting device can be locked in various positions.

Larger bowls can be tilted by means of hydraulic devices. An example can be found on page 88.