MONOTYPE

THE PUMP

The Pump system consists essentially of four parts: a) the Pump Operating Mechanism, b) the Pump, c) a means of disengaging the Pump, and d) the Melting Pot with its Gas Burners or Electric Heating Coils.

The Pump Operating Mechanism

The power to operate the Pump Mechanism is derived from the Pump Cams, which are mounted on the Cam Shafts. These Cams act upon the Pump Cam Lever which transmits its motion through the Pump Cam Lever Connecting Rod to the Pump Operating Lever.

The Pump Operating Lever, the Pump Rocker Arm, and the Pump Rocker Arm Locking Latch oscillate as a unit except when the Pump must be disengaged. When operating as a unit, the Cam motion is transmitted to the Pump Rocker Arm, the Pump Bell Crank Connecting Rod, and the Pump Bell Crank. The Pump Bell Crank is fulcrumed in the Swing Frame Post on the Pump Bell Crank Shaft. The Pump Bell Crank engages the lower Piston Lever Operating Rod Cross Head, which is pinned to the Piston Lever Operating Rod.

The Pump Body Spring Rod passes through a hole in the arm of the lower Piston Lever Operating Rod Cross Head. As the Cross Head rises, it carries this Rod with it because the Pump Body Spring acts through the Rod Sleeve upon the upper Rod Cross Head. The Pump Body Spring Rod continues to rise with the Piston Lever Operating Rod until the Stop Nuts - at the bottom of the Spring Rod - strike the Swing Frame Post. Note that before the Nuts strike the Swing Frame Post, the Pump Body Spring Rod Cross Head and the upper Piston Lever Operating Rod Cross Head rise together because the Stop in the Pump Body Spring Rod Cross Head is so adjusted that it rests <u>against</u> the Piston Cross Head (the Pump Body Spring provides the necessary force). Therefore, the two crossheads must rise as a unit. This insures that the Pump Body Lever and the Piston Lever move together; that is, the distance between their ends is not changed and there is, therefore, no motion of the Piston in relation to the Pump Body. (The mechanism for operating the Piston provides that the Piston make its stroke and deliver metal to the mold only when the Nozzle is in contact with the Mold; and that there be absolutely no movement between the Pump Body and the Piston from the time the Nozzle leaves the Mold until it is re-seated upon it. If the Piston did move in relation to the Pump Body, when the Nozzle and Mold were separated, Metal might be forced out of the Nozzle, fouling it and preventing it from seating properly on the next stroke. As was mentioned above, this squirting is avoided by having the Pump Body Spring Rod Cross Head and the upper Piston Lever Operating Rod Cross Head move as a unit.)

While the Piston Lever is rising, it releases the Pump Body Operating Lever, which permits the Pump Body Lifting Spring to raise the Nozzle against the Mold. This Spring is sufficient to overcome the weight of the Pump Body and hold the Nozzle with sufficient pressure against the Mold.

When the Stop Nuts strike the Swing Frame Post, the Pump Body has just been placed in casting position, with the Nozzle against the Mold; any further movement of the Pump Bell Crank now raises the Piston Cross Head and moves the Piston Lever by means of the Piston Spring. This causes the Piston to make its down stroke, forcing metal into the Mold. Any excess motion of the Cross Head, after the Piston has filled the Mold, and is unable to move further, is absorbed by the Piston Spring.

THE PUMP (continued)

The stroke of the Pump Bell Crank then reverses. The Pump Body Operating Rod is raised by the Operating Rod Lever, the forked end of which, as it rises, engages the Adjusting Nuts on the upper end of the Rod. (This Lever is fulcrumed upon the Pump Body Operating Lever Stand, and as this Stand is free to slide upon the Pump Body Operating Rod Lever Stand Support, it does not interfere with the Swing Frame being swung out of casting position.) As the Rod rises, it lifts the ends of the Pump Body Lifting Lever (Piston end) and the Pump Body Lifting Lever (Nozzle end) and the Pump Body falls.

At the same time, the Piston Cross Head descends, causing the Piston to make its up stroke and to be locked against the Pump Body Piston Stop; as this occurs, the Piston Cross Head comes in contact with the Pump Body Cross Head Stop. After this, the two Cross Heads descend as one piece and there can be no movement between the Pump Body and Piston.

Summary:

As the Pump Body rises into casting position, the Pump Body Lever and the Piston Lever lift together. As there is no movement between these two Levers, there can be no movement of the Piston in relation to the Pump Body, and consequently no discharge of metal. Just as the Nozzle seats, the rise of the Pump Body Lever is checked by the Rod Stop Nuts striking the Swing Frame Post. The Piston Lever moves on and, acting about the Pump Lever Connecting Link as the fulcrum, forces the Piston down, making the ejection of metal from the Nozzle.

When the Piston Cross Head, on its down stroke, strikes its Stop in the Pump Body Cross Head, the Piston must be at the top of its stroke clamped against the Pump Piston Stop. If the Connecting Link were not provided with the Spring Plunger, it would be a difficult matter to adjust this Stop so that both ends of the Piston Lever would be checked at exactly the same time. To avoid this close adjustment, the hole in the Piston Lever is made 1/32" larger than the Fulcrum Pin which passes through it. The Stop may be adjusted so that the Pin is about central in this hole, when the Piston Cross Head comes upon its Stop, and the Connecting Link Plunger Spring will then move and hold the left end of the Piston Lever against the Pump Body Piston Stop, if they are not already in contact.

Since the right ends of the Pump Body and Piston Levers rise and fall in a straight line, there is some horizontal movement in their left ends. This is provided for by the Pump Body Lever Bearings and the Piston Lever Bearings. The Levers are fulcrumed upon these bearings, which may slide across the Pump Body and Piston respectively.

The Pump

When the Piston is at the top of its stroke in the position of rest, the metal enters the Pump Body through the port in its right hand side; the size of this port is regulated by the Pump Body Regulating Screw. Note that in order to give the Piston a longer bearing, its lower end does not rise above this port. Instead, the metal passes through a hole in the Piston which comes opposite the port when the Piston is at the top of its stroke. After the Nozzle has seated on the Mold, the Piston descends and the Valve is forced down from its seat and the metal enters the Mold under the pressure due to the Piston Spring. As soon as the down stroke of the Piston stops, this Valve, which is lighter than the type metal that surrounds it, floats up on its seat, preventing the metal in the arm of the Pump Body from flowing back into the Pot. This avoids the necessity of the Piston filling the Pump Arm on every stroke. It is desirable that enough metal should flow back from the arm of the Pump Body to empty the Nozzle - thus

avoiding the possibility of metal chilling there and clogging it. The Valve is, therefore, provided with a small hole, which permits some metal to flow back through it - enough to reduce the level of the metal in the arm below the Nozzle. It is important that the hole in the Valve does not become clogged with dross.

Disengaging the Pump

When the Justification Wedges are being set, it is necessary to disengage the Pump to prevent it from casting. As was mentioned previously, the Pump Operating Lever, the Pump Rocker Arm, and the Pump Rocker Arm Locking Latch oscillate as a unit except when the Pump must be disengaged. This is accomplished by moving the Pump Trip Tube forward so that the Pump Trip Tube Collar is struck by the Pump Rocker Arm Latch on the stroke of the Rocker Arm to the right. This raises the Latch out of position and prevents its engaging the Pump Operating Lever on its stroke to the left. Therefore, the Rocker Arm does not move with the Operating Lever, but remains stationary until the Pump Trip Collar is moved from behind the Latch; then the Latch falls upon the Operating Lever, on its next stroke to the right, engaging it so that the Rocker Arm and Lever move together as a unit.

The Pump Trip Tube Collar is interposed by the action of the Justification Wedge Levers. As these are raised to lift the Wedges, they move the Pump Trip Operating Levers forward, placing the Pump Trip Collar behind the Latch, so that the Latch will strike it as described. (The method of operating the Justification Wedge Levers is described when studying another model). As soon as the Wedge Lever descends, the Pump Trip Spring moves the Pump Trip Collar back out of contact with the Latch.

The Pump may be locked out of action by hand, by pulling the Hand Pump Trip forward and latching it upon the Pump Trip Catch Plate. This locks the Pump and prevents it from acting until the Hand Pump Trip is released and the Pump Trip Tube Collar is moved back by the Pump Trip Spring.

The Melting Pot

The Melting Pot is surrounded by the Melting Pot Casing. This Casing consists of an outer and inner shell between which magnesia is placed to prevent loss of heat through radiation. The Pot may be lifted out and replaced by a new one in case it should ever burn out. The Casing is carried upon the Swing Frame. This Frame may be swung from right to left until the Swing Frame Guide Block strikes the stop on the Swing Frame Post. When in this position, the Pot may be lifted by the Swing Frame Screw until it is brought into casting position. The type metal can be melted by either Electric Heating Coils or Gas Burners.