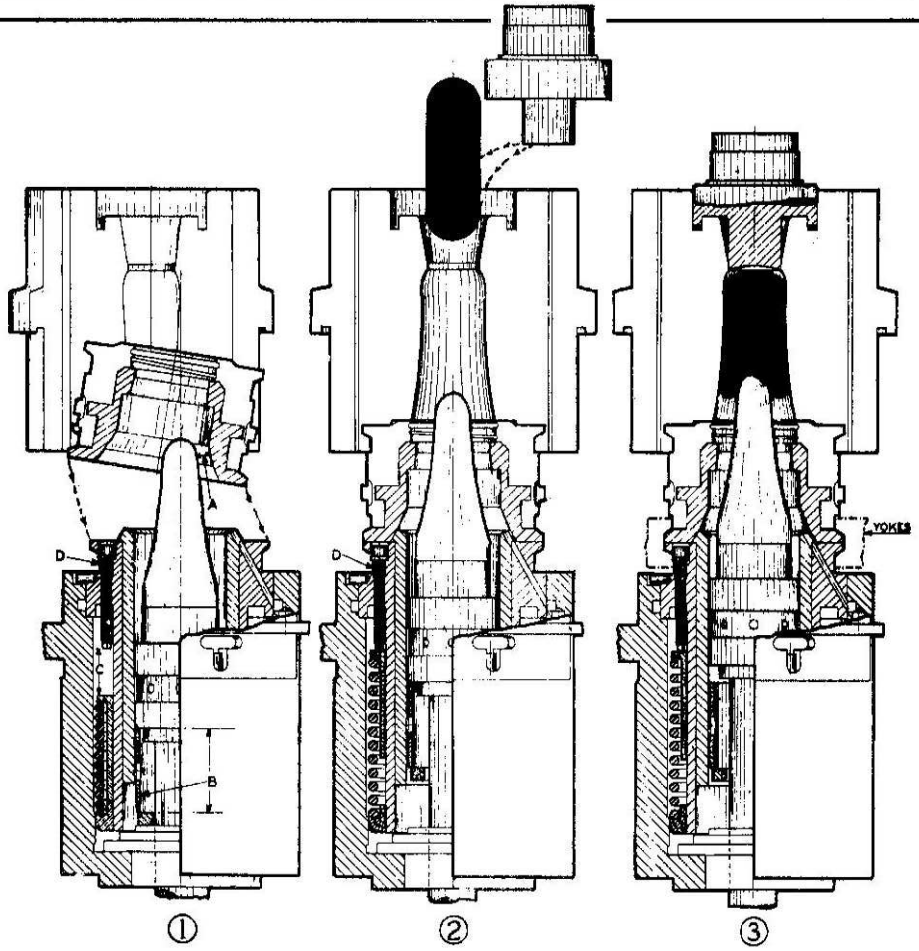
FUNCTIONAL DIAGRAM OF PARISON FORMATION BY I.S. "62" PROCESS



1. Shows the neck ring returning to the blank mold position prior to receiving the charge of glass. The down position of the plunger is determined by spacer (B), the length of which is such as to give the necessary inverting clearance shown at (A). The plunger in this down position has compressed the large spring. In most cases, measuring the length of that portion of the plunger shown as "E" in number 4 and subtracting this length from 6-1/2 inch will give the length of spacer which will provide necessary inverting clearance.

2. Blank mold closed with the plunger moved up into the glass receiving position by the action of the compressed spring. This is accomplished by knocking off the "down" plunger air (#4 valve in the valve block). The amount the plunger moves up (C) is controlled by the length of screw (D). The length of (C) is determined by trial and should be such as to give approximately the condition shown in (3). That is, the plunger should be high enough to keep the glass out of the finish prior to pressing and still permit the top of the glass charge to load below the baffle line. We suggest starting with a screw 2-1/2" in length. This will bring the tip of the plunger 3/4" above the neck ring line at loading provided the length of spacer has been determined as suggested in (1) and then by trial gradually increase or decrease length of screw to give condition stated above.

3. In all cases, the baffle should be timed to seat as soon after loading as possible and the pressing stroke of the plunger should start as soon after the baffle is seated as is possible. The pressing stroke of the plunger is under control of the #6 valve or present counterblow valve. The plunger is shown just starting its pressing stroke. The neck rings are held closed and brought into alignment with the pressing cylinder by means of yokes shown in dot and dash.

DESCRIPTION OF I.S. MACHINE VALVE ACTIONS

Valve No.	Name	Description
1	Scoop	No needle valve control. Sequence and duration of action controlled by plugs on timing drum. Action controlled by trip valve on top of machine on side of scoop cylinder.
2	Blank close	Needle valve control in valve block for speed of action. Sequence and duration controlled by plugs on timing drum. Location of long plug controls time of blank crack (See #8)
3	Thimble	Needle valve control in valve block for speed of action. Sequence and duration controlled by plugs on timing drum. Return action by spring.
4	Plunger	Needle valve control in valve block for speed of action. Sequence and duration controlled by plugs on timing drum. Return action by spring.
5	Funnel	Needle valve control in valve block for speed of action. Sequence and duration controlled by plugs on timing drum. Return action by spring.
6	Counterblow	Sequence and duration of time controlled by plugs on timing drum. Pressure controlled by regulating valve in valve block.
7A	Settleblow	Settleblow is obtained thru a bypass in funnel mechanism and into baffle. It is an individual line independent from machine pressure, with no reducing pressure control. Should have at least a 35 lb. pressure. Sequence and duration of time controlled by plugs on timing drum.
7B	Baffle	Needle valve control in valve block for speed of action. Sequence and duration of time controlled by plugs on timing drum. Action controlled by trip valve on side of scoop cylinder.

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DESCRIPTION OF I.S. MACHINE VALVE ACTIONS

Valve No.	Name	Description
8	Blank Open	Needle valve control in valve block for speed of action. Sequence and duration of time controlled by plugs on timing drums. Blank crack is an automatic operation actuated by spring in end of cylinder mechanism, when air pressure is released in valve #2 spring work piston back cracking blank approximately 3/16.
9	Invert	Sequence and duration of time required to complete operation controlled by plugs on timing drum. Speed of action of invert is controlled by exhaust thru revert needle valve #11. Example: Invert too fast - Close needle valve on revert #11. Invert too slow - Open needle valve on revert #11.
10A	Neck Ring Open	Needle valve control in valve block to regulate opening speed with spring closing action. Sequence of action controlled by single plug on timing drum.
10B	Deflector Oiler	Deflector oil is obtained by air thru a bypass in neck ring mechanism in the reverted position, actuated by plugs on timing drum. Oil consumption is regulated by a valve in air line leading to deflector oiler.
11	Revert	Sequence and duration of time required to complete operation of revert controlled by plugs on timing drum. Speed of action is controlled by exhaust air invert needle valve #9. Example: Revert too fast - Close needle valve on Invert #9. Revert too slow - Open needle valve on Invert #9.

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DESCRIPTION OF I.S. MACHINE VALVE ACTIONS

Valve No.	Name	Description
12	Blowhead	Needle valve control in valve block for speed of action. Sequence and duration controlled by plug on timing drum. Action controlled by trip valve at base of blowhead post.
13	Final Blow	Sequence and duration of time controlled by plug on timing drum. Pressure controlled by regulating valve in blowhead arm.
14	Mold Close	Needle valve control in valve block for speed of action. Sequence and duration controlled by plugs on timing drum.
15	Mold Open	Needle valve control in valve block for speed of action. Sequence and duration of time controlled by plugs on timing drum. Mold crack is an automatic operation actuated by spring in end of cylinder mechanism; when air pressure is released in valve #14 spring works piston back cracking mold approximately 3/16".
16	Bottom plate up	Needle valve control in valve block for speed of action. Sequence and duration controlled by plugs on timing drum.
17	Bottom plate down	Needle valve control in valve block for speed of action. Sequence and duration controlled by plugs on timing drum.
18	Takeout In	Sequence and duration of time required to complete operation controlled by plugs on timing drum. Speed of action controlled by exhaust thru needle valve #19. Example: Takeout in is too slow - Open needle valve on Take-out #19. Takeout in is too fast - Close needle valve on Take-out #19

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DESCRIPTION OF I.S. MACHINE VALVE ACTIONS

Valve No.	Name	Description
19A	Takeout out	Sequence and duration of time required to complete operation controlled by plugs on timing drum. Speed of actions controlled by exhaust thru needle valve #18. Example: Takeout out too slow - Open needle valve on Takeout #18. Takeout out too fast - Close needle valve on Takeout #1.
19B	Tongs close	Tongs close actuated by valve #19. Sequence and duration of time controlled by same plugs on timing drum that actuate takeout. Control of tong closing action regulated by needle valve located in head of takeout.

EXPLANATION OF PARISON FORMATION BY I.S. BLOW AND BLOW PROCESS

1. DELIVERY

Gob should pass through mold funnel without rubbing and with approximately 1/32" clearance on the diameter. This will give accurate loading with a minimum of marking of gob, and yet give sufficient vent to the blank to keep the formation of an air pocket, which would prevent solid loading, to a minimum. With best loading the gob settles uniformly and almost entirely into its ultimate shape before settle blow.

To insure best loading, the clearance between the plunger and thimble or plunger and finish guide plate should be as specified in the I.S. Machine Mold Data Book. Equipment must be kept clean to prevent reduction of vents.

2. SETTLE BLOW

Settle blow should be applied as soon as possible after loading. This is necessary to obtain uniform contact with the metal at the earliest possible moment.

The settle blow time should be kept to a minimum, using only sufficient time to set up the finish to withstand the following counterblowing. Large or heavy finishes require more time to set up the finish than the smaller finishes. The minimum settle blow time will also give the minimum settle wave in the finished bottle.

3. COUNTER BLOW

(A) Corkage Reheat

As soon as the settle blow pressure is relieved, the plunger should be withdrawn to allow corkage reheat, or softening of the glass immediately above the plunger, to permit counterblow to form a symmetrical bubble in the parison without distorting the finish.

Hot plungers allow a minimum of reheat time, assisting in obtaining the best distribution in the final bottle. A short corkage reheat helps in eliminating settle wave by permitting earlier counterblow and obtaining complete glass blank contact at the earliest possible moment. However, too short a short reheat may leave a skin on the plunger contour, which breaks irregularly on counterblow and gives a lumpy or irregular distribution in the final bottle.

EXPLANATION OF PARISON FORMATION BY I.S. BLOW AND BLOW PROCESS

(B) Counterblow

The earlier counterblow can be brought on, the less settle wave will be apparent in the final bottle. The longer the counterblow is left on the better the balance of heat removal between the blank and blow mold, permitting maximum machine speed and hot mold practice.

The pressure used must be suited to the particular size of the bottle, that is, the larger the quantity of glass, the greater the pressure.

In general, more stable operation, better distribution and higher speeds can be obtained by using maximum blank contact time.

(C) Parison Reheat

After counterblow and before final blow, the parison must be reheated to equalize temperatures and eliminate skin conditions. This overlaps with the transfer from blank to blow mold.

(D) Plunger Cooling or Parison Puffing

Larger size plungers may tend to run hot enough to stick to the glass. This can be avoided by bringing on the counterblow immediately after invert and continuing long enough to sufficiently cool the plunger. This cooling air must shut off, however, well before gob loads to prevent building up an air pocket.

Parison puff after the blank opens may be of help in gaining better distribution on panel bottles.

4. TRANSFER FROM BLANK MOLD TO BLOW MOLD

During the time the parison is transferred from the blank to the mold, the parison is reheating. The speed of invert affects the distribution of the finished bottle in that if it is too slow, the parison will sag sidewise due to gravity; if too fast, the parison is thrown out by the centrifugal force. The speed must be varied to suit the weight, viscosity and shape of parison. Reheat in blank side allows the parison to sag and on the blow mold side to run, and the two effects have to be counterbalanced.

5. REHEAT

This is the period between the end of the invert and the start of the final blow. During this time the parison finishes its reheat or temperature equalization, and gravity stretches the parison.

EXPLANATION OF PARISON FORMATION BY I.S. BLOW AND BLOW PROCESS

6. FINAL BLOW

This is the application of pressure to form the final bottle. The pressure required varies according to the bottle weight and shape, tending to be less with larger bottles. Large bottles have longer mold contact time and excessive heat removal can cause checking.

In general, final blow time should be the maximum to amply harden the bottle before it is removed from the blow mold.

7. TAKEOUT

After the blow mold opens the takeout jaws pick up the finished bottle and place it on the dead plate. Takeout jaws should line up properly, have clearance so that the bottle hangs freely, and the takeout mechanism should move the cushion smoothly. Circulation of air around bottle over the dead plate is more effective when the bottle is held off the dead plate. The bottom may sag or be pushed up by the dead plate wind depending upon the pressure of air, the softness of the bottom and time it is held. Therefore, the time of release over dead plate is important.

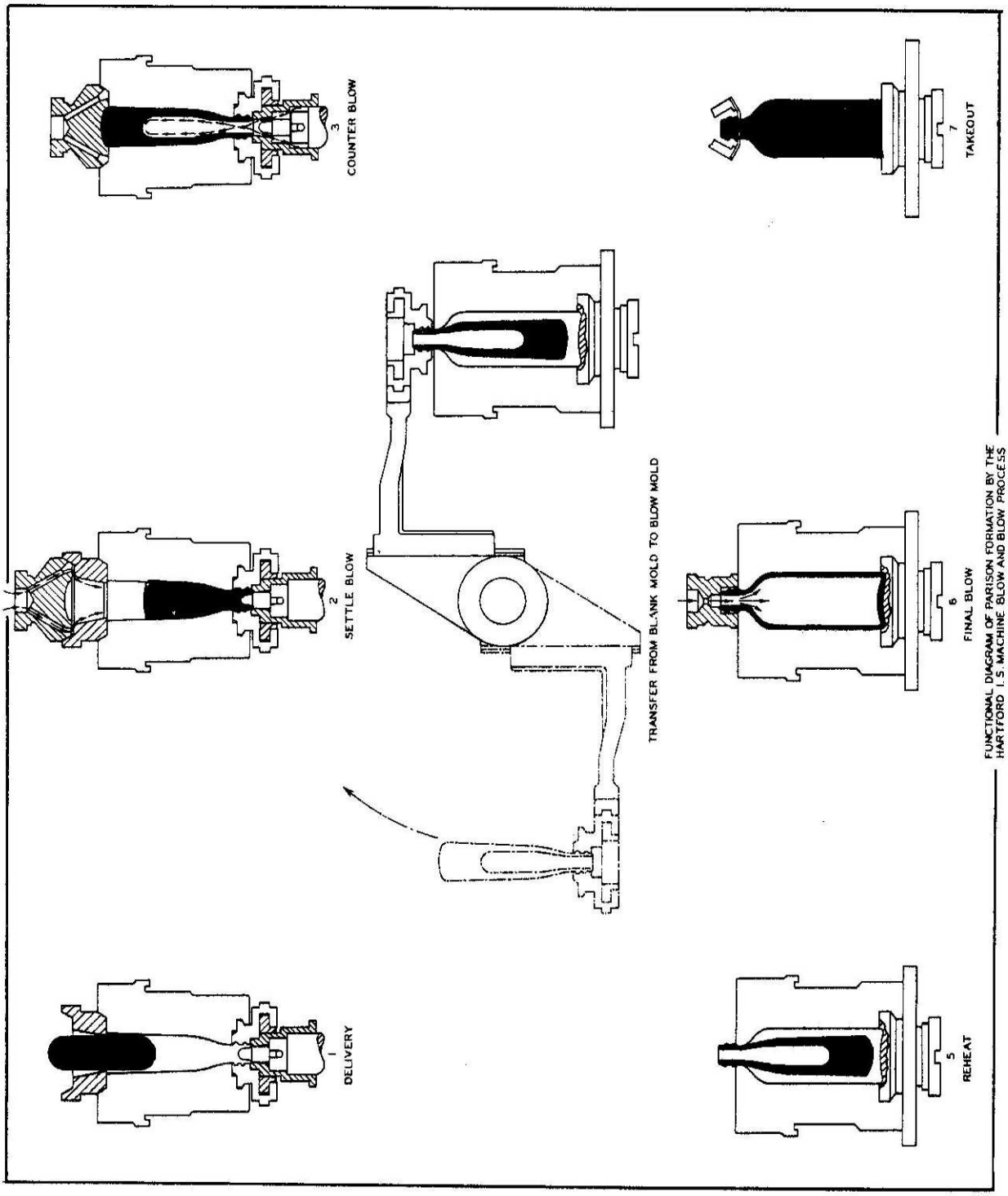
GENERAL

Cooling Wind

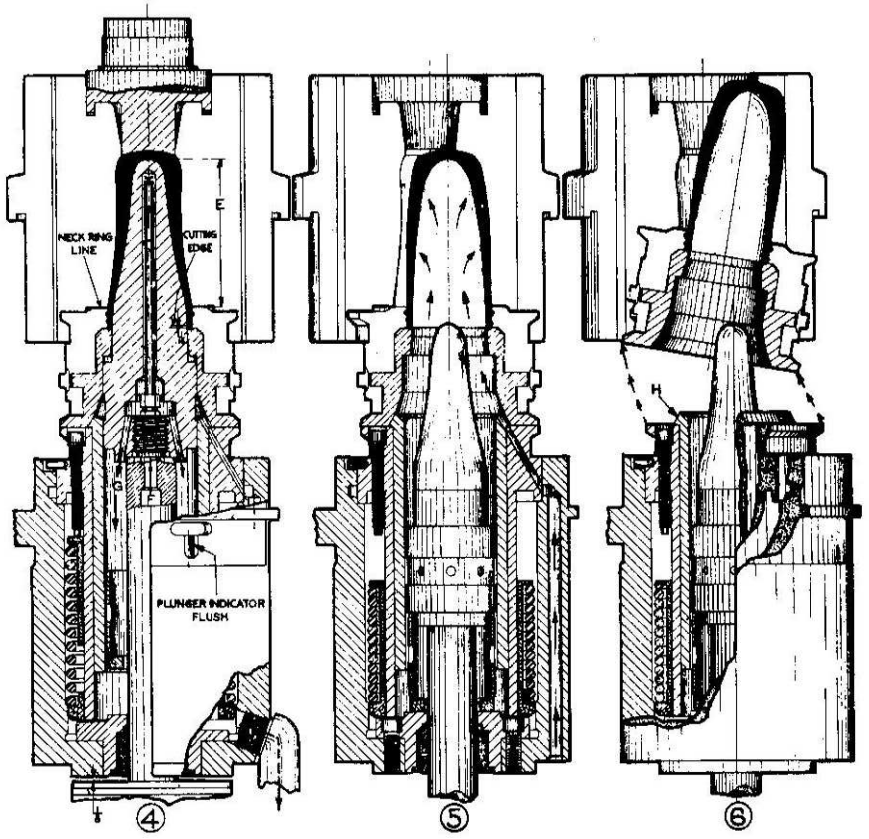
Cooling wind should not be applied on a startup until cold appearance or general waviness of finished bottle has disappeared and bottle will not hold shape. Hot mold practice will give the best results with average glass. Use as small wind nozzles as possible, as high wind velocities create more efficient cooling than large volume.

Dead Plate Cooling

The purpose of the dead plate is to make the bottle hold its shape. This dead plate is perforated with holes so that the cooling wind is directed against the bottom and sides of the bottle.


FUNCTIONAL DIAGRAM OF PARISON FORMATION BY I.S. BLOW AND BLOW PROCESS
1 DELIVERY
2 SETTLE BLOW
3 COUNTER BLOW
TRANSFER FROM BLANK MOLD TO BLOW MOLD
5 REHEAT
6 FINAL BLOW
7 TAKEOUT
FUNCTIONAL DIAGRAM OF PARISON FORMATION BY THE HARTFORD I.S. MACHINE BLOW AND BLOW PROCESS

FUNCTIONAL DIAGRAM OF PARISON FORMATION BY I.S. "62" PROCESS



4. The plunger is in the full pressing position. The water cooling system is shown with the water entering at (F) and discharging through holes (G). The drain to the outside of the machine is shown at the lower right. The water cooling is applied intermittently and is on only during the pressing stroke. Plungers are designed to have cutting edge project through guide ring 1/16" at correct weight and when in this position. The plunger indicator should be flush as shown. The plunger has still 1/8" more stroke to take care of weight variation.

5. Shows the pressing completed and the plunger withdrawn. The blank is opened slightly to provide rapid reheat. Puffing is frequently used to expand the parison slightly, as shown, just prior to invert. The puffing is under control of the present thimble, or #3 valve.

6. The blank mold is wide open and the parison is shown inverting to the blow mold position where the final blowing is carried on in the usual I.S. manner. Plunger head shown accommodates plungers for finishes up to 70 MM. For finishes above 70 MM and up to 90 MM bushing "H" is removed to accommodate the larger plunger head required.

BLANK AND BLOW MOLD EQUIPMENT TOLERANCES AND CLEARANCES

The maximum and minimum clearances allowed in the operation of blank and blow mold equipment is shown on the chart on the following page. This will give proper operating conditions and maximum efficiency from the mold equipment.

An understanding of tolerances and clearances built into the mold equipment explains why improper settings, dirt and carbon formations, and careless handling of equipment will cause production losses.

On the following page is a chart which illustrates the maximum and minimum tolerances and clearances.

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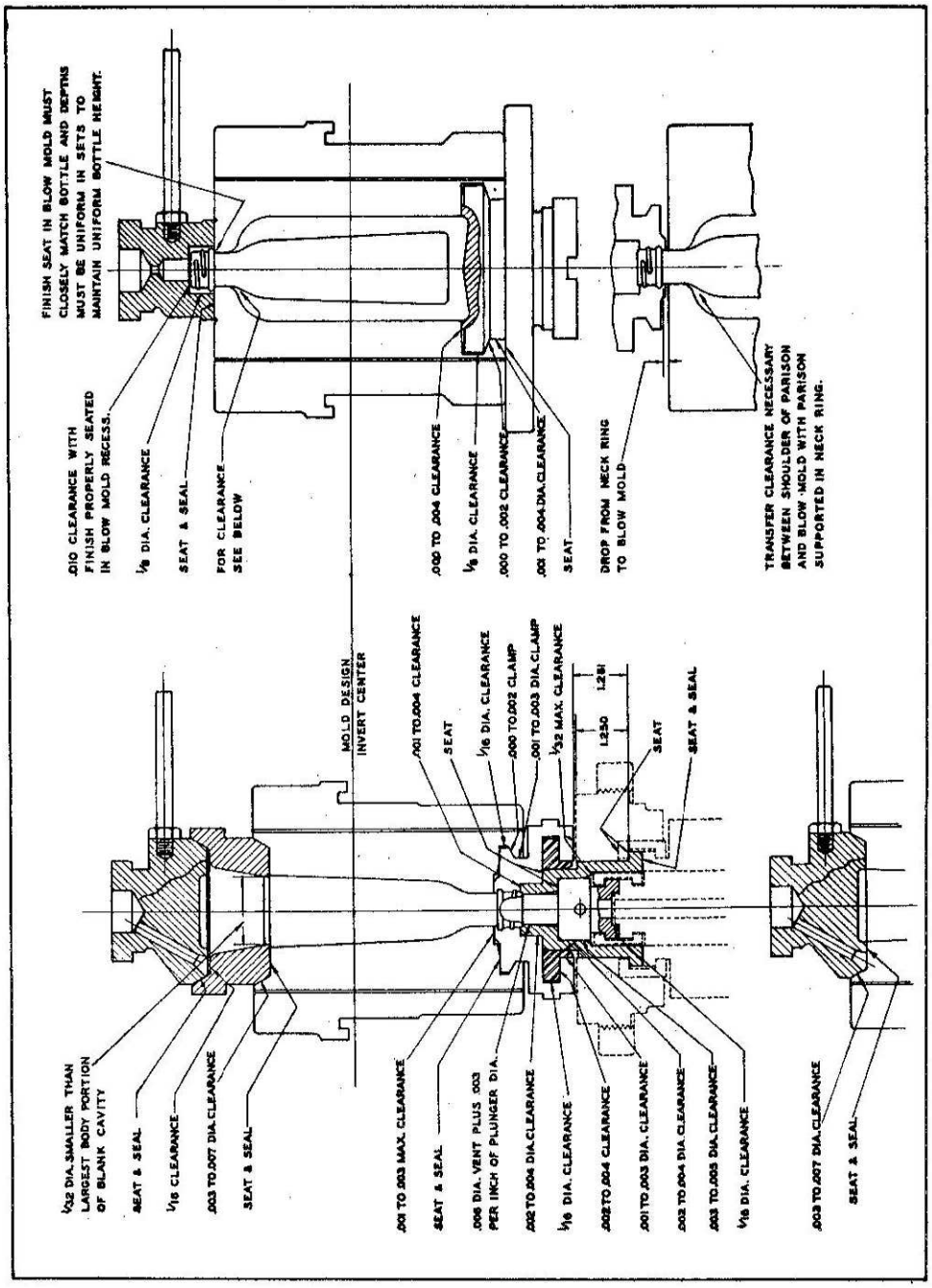
BLANK AND BLOW MOLD EQUIPMENT TOLERANCES AND CLEARANCES



STARTING UP MACHINE

Turn timing drum so that the second "O" button of valve #7 (baffle down) shows just clear of the valve block. Always start and stop with drum in this position.

Trip all valves by hand. Then open quarter turn valve cautiously to admit air to valve block slowly.

Hand latch and trip valves as necessary to remove blank molds. Lock takeout at halfway position with locking pin. Close blowhead #12 line needle valve so blowhead will not operate.

It is important to do this to avoid all possible damage to the equipment. This damage can be caused by the sticky action of the machine after shutdown, and the mechanical interferences which always follow first readjustment of plug settings before corrective needle valve and plug settings are made. Make sure quarter turn scoop valves are closed. Make sure neck ring arms are in revert position (blank side). Hand latch valve #11 and valve #8 to avoid interference between neck ring arms and baffle, funnel, blowhead, takeout or blank holders.

Start - only one section at a time - by turning valve handle in valve block to extreme left.

Needle valves in valve block should now be adjusted to get smooth mechanical action. All needle valve adjustments should be very slight. And they should be made while watching actions carefully to avoid interference with other actions. Needle valves regulate the speed of action of individual mechanisms. This makes it necessary to study individual mechanical actions and their effect on other mechanical actions to get smooth mechanical running of each section.

Start takeout action by removing locking pin. Open and adjust blowhead action in relation to invert, revert, mold close, and mold open actions.

Maintain machine line air pressure at 30 pounds.

Be sure all lock nuts are tight on needle valves after final adjustments have been made. A special wrench is provided for this purpose.

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STARTING UP MACHINE

When machine is working as nearly mechanically perfect as possible, stop each section and replace blanks. Then start each section and let it run to limber up while other readjustments are being made.

After these readjustments are made, stop each section and replace neck rings and baffles. Again, start each section and let it run to limber up while other readjustments are being worked on.

Be sure clutch is engaged in right relation with timing drum. (Hold drum when starting).

Be sure oil tanks are properly filled.

Be sure scoop and deflector oilers are functioning properly - delivering smooth white sprays, no sputtering.

Be sure the gob is satisfactory in shape and is dropping true, neither curling nor throwing.

TIMING GLASS INTO MACHINE
(Extremely important - seldom done correctly)

Open the quarter turn scoop valve of one section only to allow a few gobs to travel into machine. Observe time relation of scoop action and drop. Scoop should come to rest at the end of cushioning action just before gob lands in scoop. And it should start return action immediately after gob enters trough.

Observe time relation of gob and mold funnel. Gob should leave deflector or deflector funnel immediately following the motion of the mold funnel to the blank mold.

A differential timer is provided to time machine with the feeder. This timer is located at the top of the machine and adjusts the time of gob entry into mold funnel and blank mold. With the scoops, troughs and deflectors properly lubricated, and after gob is properly timed to mold, plugs and needle valves #1 may require slight readjustment.

Spotty lubrication seriously affects gob timing.

GUIDING GLASS INTO MACHINE

Gob must be shearing cleanly from feeder and dropping squarely and centrally into scoop at all times.

The deflector is mounted on a two way horizontal, adjustable bracket for central guiding of the drop into mold funnel.

When glass is delivering through mold funnel centrally onto plunger and thimble, stop the section and replace blank mold.

WARMING UP MOLDS

Operators should not start glass into cold molds, (after job changes), until authorized or ordered by the machine foreman.

Start up one section at a time. Operator and machine foreman should stand by blow mold to watch for trouble and clean away glass until job lines out so that bottles can go into lehr. Do not allow pinching of glass in molds. It ruins good molds immediately.

Watch mold actions and glass action through the section and make refining mechanical adjustments as the molds warm up. Adjust to take out all winking, lifting, or dropping of mold part actions that are at variance with smooth opening or closing of mold parts. Adjust as necessary for clean transfer from neck ring to blow mold; and for clean pickup and setdown of bottle by takeout.

Watch parison and bottle for distribution development by timing adjustment or by glass temperature control. Study mold temperature effects and apply wind cautiously as needed.

Start second section after first section is working properly and heating molds.

Start next section and other succeeding sections only after preceding section is lined out or as ordered by line foreman.

Adjust timing and cooling as sections reach operating temperatures.

Note: This progressive careful starting up is the best method for high productions, high bonus earnings, and low mold maintenance costs.

FORMING DEPARTMENT

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FILM INDEX