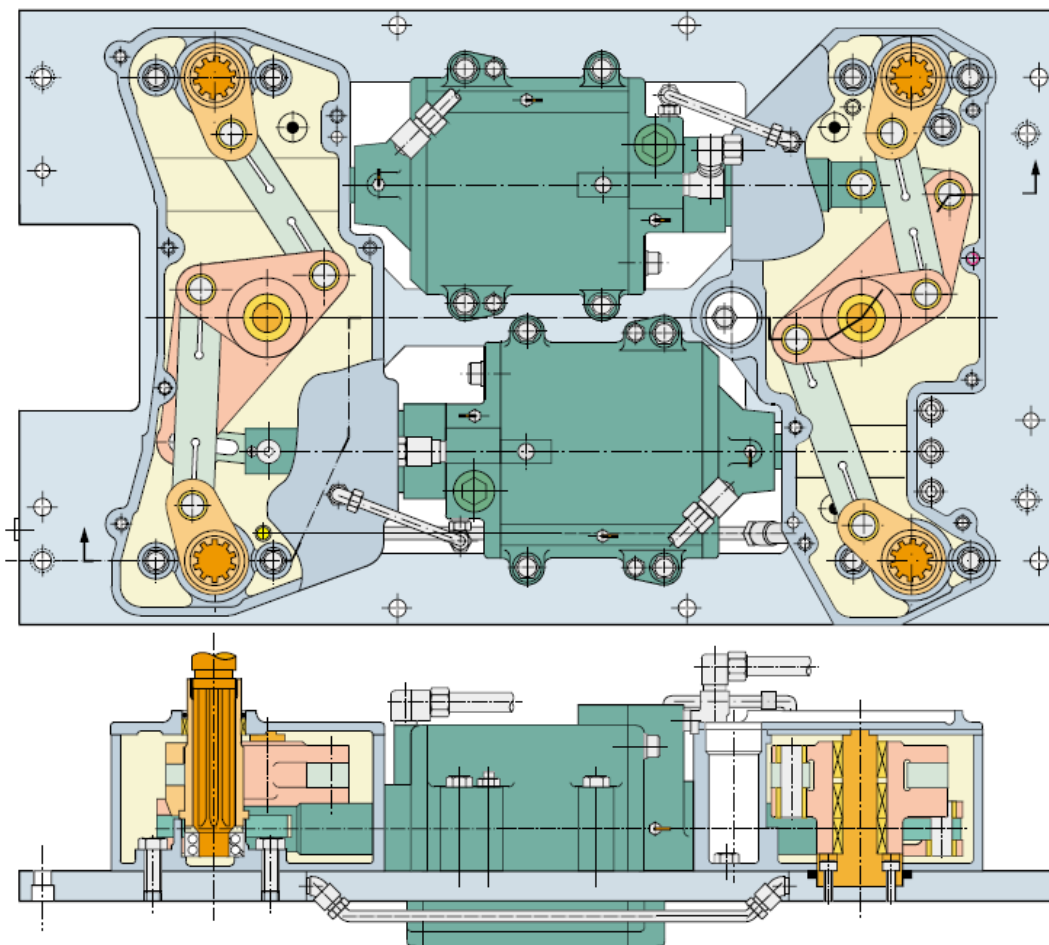


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Mold Open and Close Mechanism with Linkage in Oil For Machine Types E & EF 4 ¼ and 5

- Redesigned linkage for great closing force with the same bearing loads.
- Modular design can be integrated in frames with modification.
- Revised bearing support for mold shaft.

Introduction

Emhart Glass has developed a new Mold Open and Close Mechanism (MOC) with linkage in oil for machine types E & EF 4 -1/4 and 5. This mechanism utilizes a linkage system which supplies significantly higher mold closing forces (**Table 1**) to counteract the opening forces associated with conventional NNPB processes. Due to these increased forces, the system requires new, reinforced blank mold support brackets and mold shafts.

Description

The mold open/close cylinders and linkage housings are mounted on a modular baseplate (**Fig. 1**) for precise alignment and ease of assembly. The cylinders are provided with a top-mounted cartridge type check valve to improve maintenance accessibility. Perma-Seal piston rings are installed to greatly reduce air blow-by. Larger operating air piping permits increased operation speed. The cylinder drain lines are routed through the baseplate to remote petcocks at the blow side of the machine. The linkage system has been redesigned for increased closing force and to ensure longer service life. Pin and bushing diameters have been enlarged, and the material specification of the link and levers has been changed to a higher grade material. Oil filling lines to the linkage housing are routed through the baseplate from the blank side and are provided with an oil level gauge. Additional mold shaft bearing supports are integrated in the housing cover. For assembly ease, the covers are split into two halves. An overlapping joint provides impeccable sealing. The foot for the Series 3000 Plunger Mechanism is integrated in the linkage housing. The height adjustment gear is mounted in the housing cover.

The casting of the blank mold support bracket has been strengthened (**Fig. 2**) for improved support of the hinge pin and mold shaft. Mold shaft bending is prevented by additional roller bearings mounted in the anti-deflection support. Lubrication oil passages for the mold shaft bearings are integrated in the bracket. Mold shafts are manufactured of a higher grade material and exhibit a new high torque spline profile. A removable yoke interconnects the anti-deflection bracket with the top of the hinge pin which is thus supported.

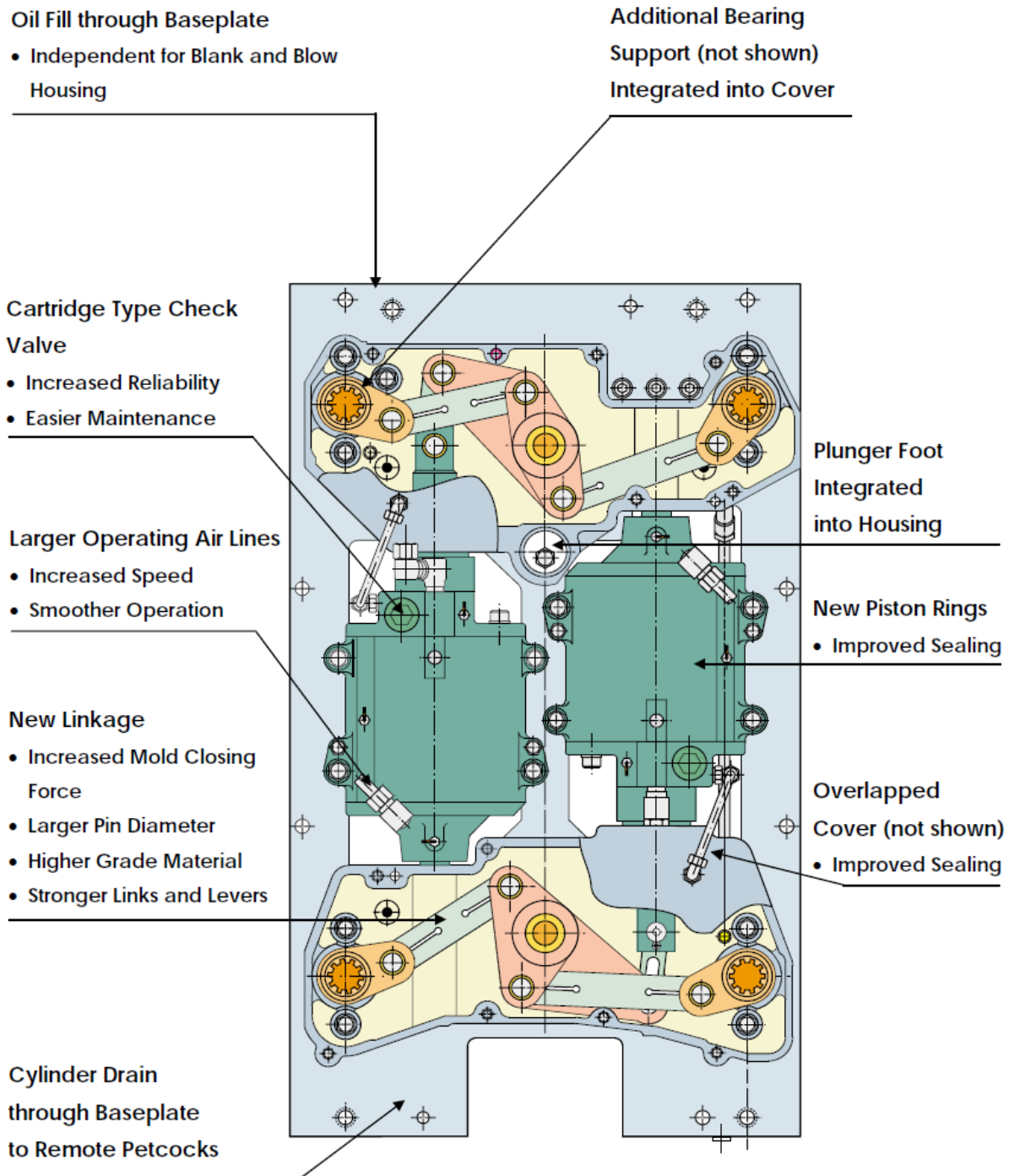


Fig. 1: MOC Mechanism with Linkage in Oil

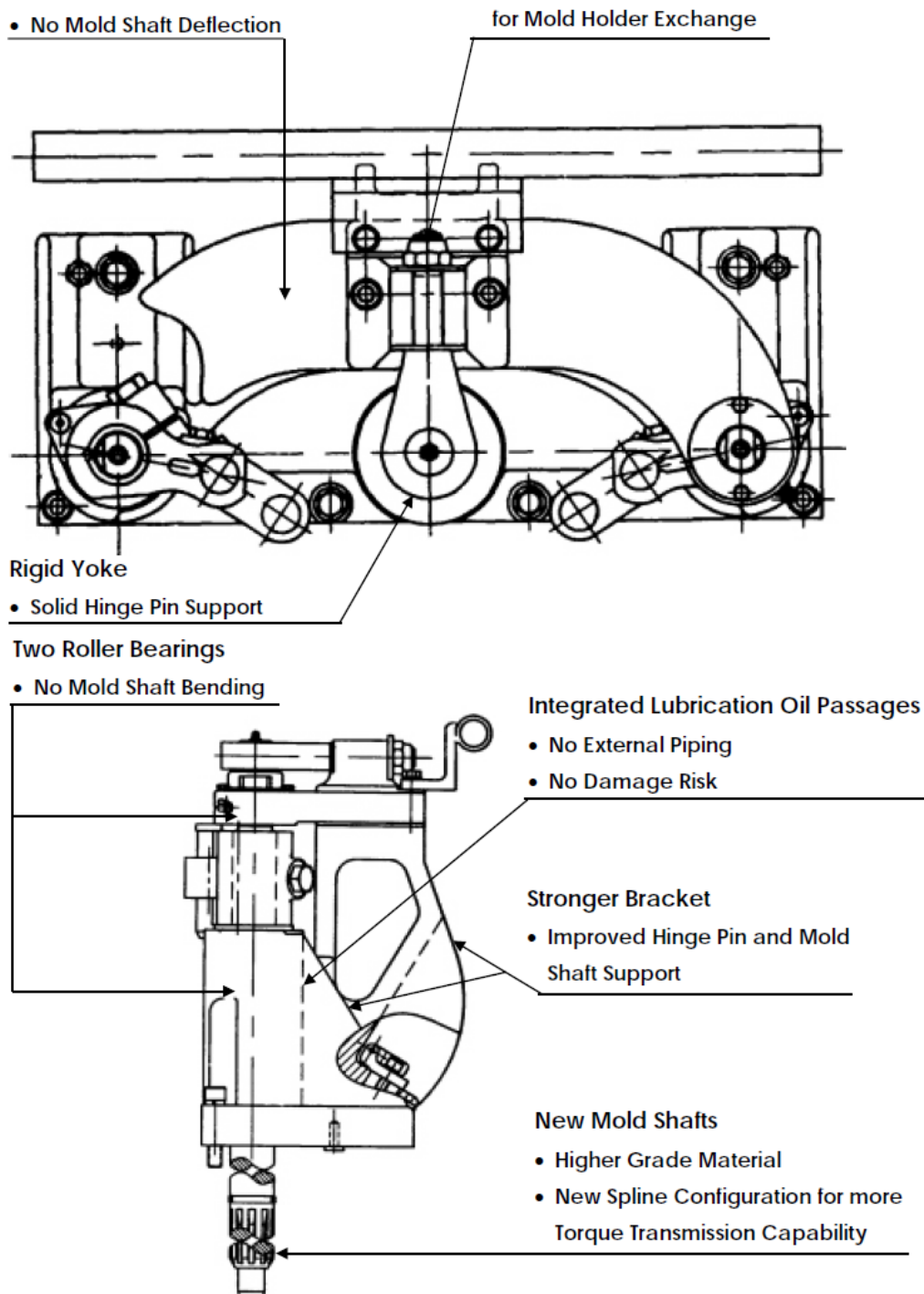


Fig. 2: Blank Mold Support Assembly

Mold Holder Arms and Inserts

The increased mold closing forces exert greater stress on the mold holder arms. While existing mold holder arms can still be used on the blow side, new mold holder arms are recommended on the blank side for DG 4 -1/4 operation. The scissors type blank mold holder arm concept which was used solely in the case of machine types E & EF 5 has been discontinued in favor of the reinforced blank mold support bracket and the anti-deflection support. New blank mold holder arms and inserts are thereby required for DG 5 operation, and new blank mold holder arms are necessary for SG operation. **Table 2** lists the new mold holder arms and subsequent improvements. Mold design remains unchanged for the new mold holder arms and inserts. Therefore, existing mold equipment can still be used.

Conversion

Type E & EF machine sections in the field can be converted to the MOC mechanism with linkage in oil but modifications are required. Beside exchange of the blank mold support assembly, blow side mold shafts and some repiping work, the section frames must be machined to clear the linkage housings. Due to the involved nature of this work, conversion is therefore recommended only in connection with a complete section exchange.

Features/Benefits

Features	Benefits
Linkage in Oil	Greatly Improved Life of Conventional Linkages
Redesigned Linkage	Greater Closing Force with Same Bearing Loads
Quick Change Check Valve	Check Valves Changed with Minimum Downtime
High Strength Mold Shafts	Minimizes Breakage; Better Torque Transmission
Revised Bearing Support for Mold Shafts	No Mold Shaft Bending
Modular Design	Can be Integrated in Frames Modifications Required

Parts Specification

The main assembly drawings for the linkage in oil system are listed below. The MOC Mechanisms are identical for the Type E & EF machines except for the baseplate. The blow mold support assemblies are identical to the previous assemblies except for the mold shafts.

Section Type	Frame Assembly	Link/Oil MOC	Blank Bracket	Blow Bracket
E 4-1/4	191-8434	191-8400	191-8441	200-1001
E 5	191-8435	191-8400	191-8418	200-1001
E F 4-1/4	200-100	200-1000	191-8441	200-1001
EF 5	200-101	200-1000	191-8418	200-1001
EF 3 TG	200-100	200-1000	191-8452	200-1001

MOC Mechanism Closing Force Comparison (TABLE 1)

Closing Forces per Cavity				
	MOC Mechanism Type			
	Conventional		Linkage in Oil 200-1000, 191-8400	
	Blank Side	Blow Side	Blank Side	Blow Side
Operating Pressure	3.1 bar 45 psi	2.1 bar 30 psi	3.1 bar 45 psi	2.1 bar 30 psi
DG 4-1/4	3730 N 840 lbf	2400 N 540 lbf	5790 N 1300 lbf	3530 N 795 lbf
DG 5	2940 N 1) 660 lbf 1)	2260 N 505 lbf	5200 N 2) 1170 lbf 2)	3430 N 770 lbf
TG 3	2650 N 595 lbf	1620 N 365 lbf	3870 N 870 lbf	2350 N 530 lbf

- 1) Scissors Type Blank Arms
2) Non-Scissors Type Blank Arms

Mold Holder Arms (TABLE 2)

Description	Previous Arm	New Arm	Improvements	Application
SG 4 1/4				
No. 0 Standard	191-5669-1	191-5669-2	Higher grade material and standardization on block lock for locating molds.	May require changing molds from plunger lock to block lock configuration.
No. 1 Standard	191-5670-1	191-5670-2		
No. 2 Standard	191-5665-1	191-5665-2		
No. 3 Standard	191-5970-2	191-5970-3		
No. 4 Standard	191-5971-2	191-5971-3		
No. 5 Standard	191-6272-1	191-6272-2		
SG 5	Scissors	Non-Scissors		
No. 5 Standard	191-9332-1	200-204-1	Replaced by non-scissor arm for standardization, safety and reliability. Can be mounted on new blank bracket with anti-deflection support.	Will mount on previous brackets, requiring new lever, link, and pinning to new mold shaft.
No. 5 Offset	191-9332-2	200-204-2		
No. 4 Standard	191-9332-3	200-204-3		
No. 4 Offset	191-9332-4	200-204-4		
DG 4 1/4				
Double Deck	191-5990-1	191-8456-1	Stronger material, smaller dia. limit pin in critical strength area of arm	To use existing inserts requires bushing limit pin hole.
Triple Deck	191-5902-1	191-8504-1		
DG 5	Scissors	Non-Scissors		
No. 1 Blank	191-9006-1	191-9240-2	Replaced by non-scissor arm for standardization, safety and reliability. Can be mounted on new blank bracket with anti-deflection support.	Will mount on previous brackets and new ones with new lever, link and pinning to new mold shaft.
No. 2 Blank	191-9007-1	191-9241-2		
No. 3 Blank	191-9008-1	191-9242-2		
	Non-Scissors			
No. 1 Blank	191-9240-1	191-9240-2	Stronger material, limit pin relocated outside critical area.	Direct replacement.
No. 2 Blank	191-9241-1	191-9241-2		
No. 3 Blank	191-9242-1	191-9242-2		