

SHIMPO PUGMILL

De-Air Type

Model NVA-07/15

Operation Manual

A Tradition of Excellence

SHIMPO

A Nidec Group Company

NIDEC-SHIMPO AMERICA CORPORATION • Itasca, IL 60143 USA • Phone: (800) 237-7079 • (630) 924-7138 • Fax: (630) 924-0340
www.shimpoceramics.com • info@shimpoceramics.com

SHIMPO PUGMILL

- De-Air Type -

Model NVA-07/15

OPERATION MANUAL



Distributor :

Manufacturer :

Shimpo Industrial Co., Ltd.

338 Tonoshiro-cho, Kuze, Minami-ku, Kyoto, Japan

Telex: 5429903 SHIMPO J. Cable : SHIMPO KYOTO

Tel: (075) 921 - 7151

(TO OPERATE BETTER)

1) How to throw clay into screws.

Throw in clay into screws little by little.
(Clay of about the size of a fist is moderate for NVA-07.) according to the quantity of clay, taken into screws.

Throw or drop the clay of a fist size or flat board as shown in fig.1 inbetween two screws. Avoid throwing excessive quantity of clay, and clod of dry clay, stone, or pieces of wood to refrain from damaging Pugmill. SHIMPO pugmill is not available for a mixer.

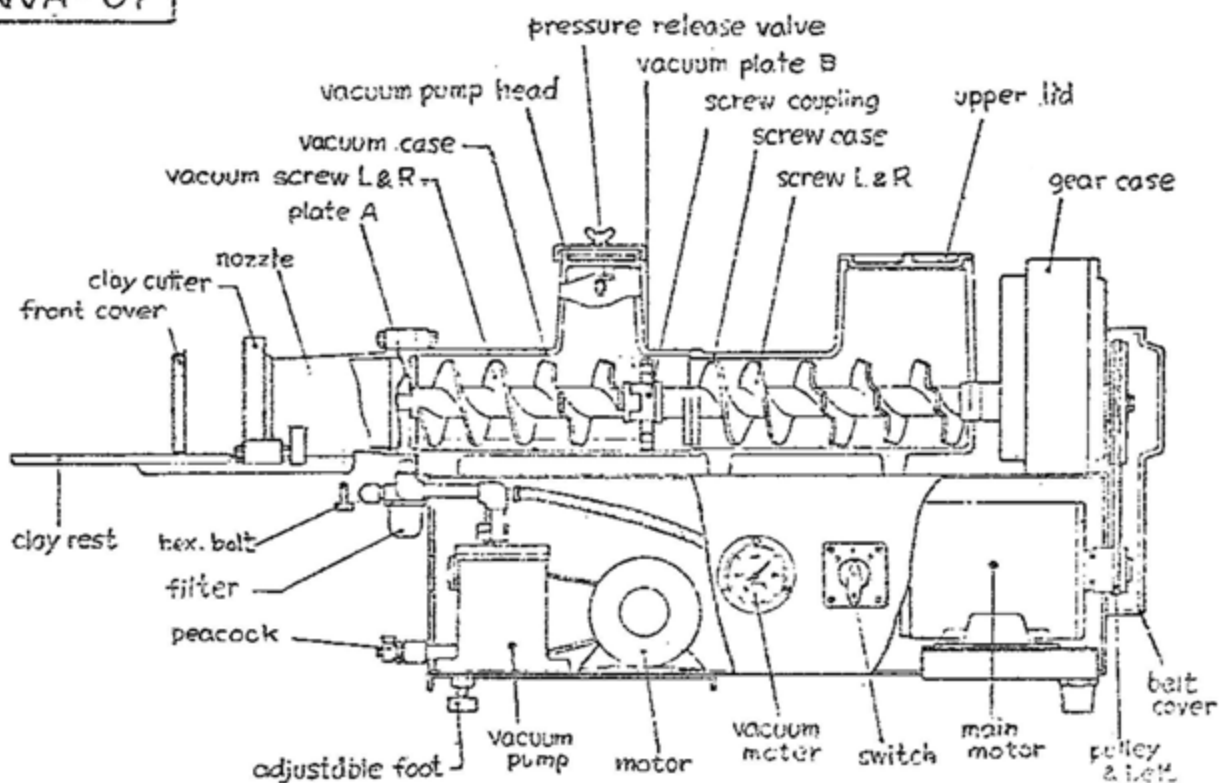
2) Dry or wet clay

Dried and hard clay or muddy like too wet clay will lower the performance of vacuum pump. Dip dried hard clay into water and make it soft and make wet clay flat and dry it before throwing it into screws.

Specifications

Model Spec.		NVA - 07	NVA - 15
Dimensions		L950 x H500 x W300 mm	L1300 x H650 x W320 mm
RPM of screws		24rpm/60Hz. 20rpm/50Hz.	25rpm/60Hz. 21rpm/50Hz.
Motor	(Pugmill)	750W, 3-phase, 200V, 3.8/3.3A, 50/60Hz.	1500W, 3-phase, 200V 6.8/6.2A, 50/60Hz.
	(Vacuum pump)	100W, 3-phase, 200V, 0.78/0.68A, 50/60Hz.	200W, 3-phase, 200V, 1.2/1.1A, 50/60Hz.
Capacity		400 Kgs/hr.	650 Kgs/hr.
Weight		75 Kgs.	155 Kgs.

NVA-07



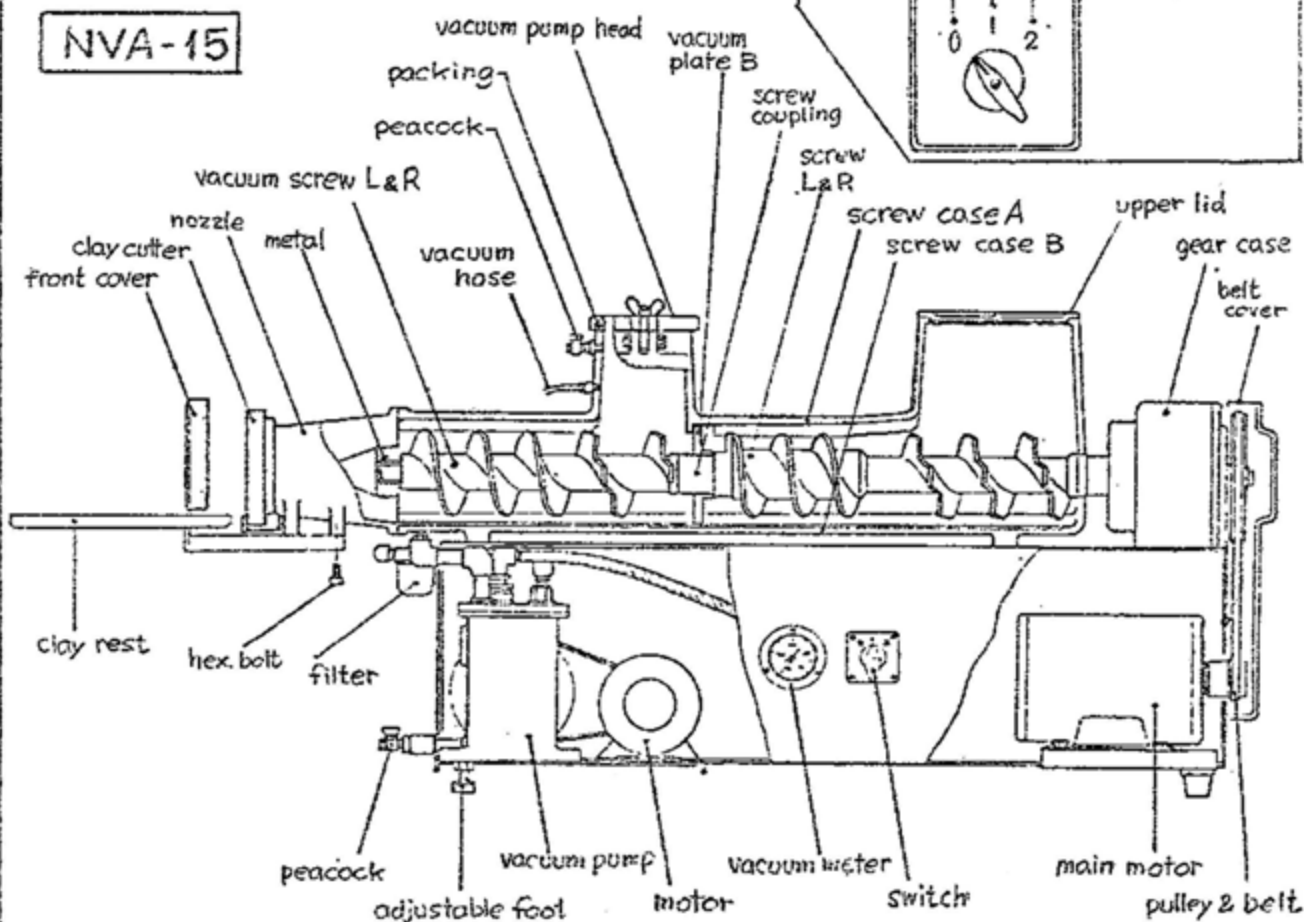
Vacuum pump : ON

OFF

Vacuum pump &
Main motor : ON



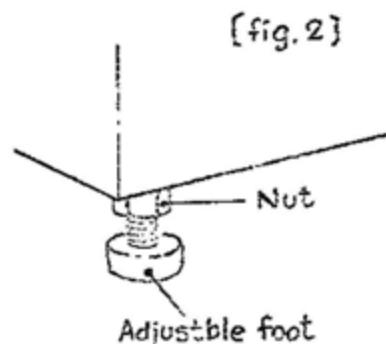
NVA-15



1 INSTALLATION

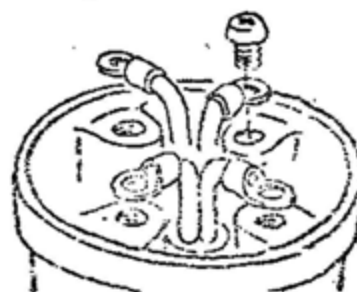
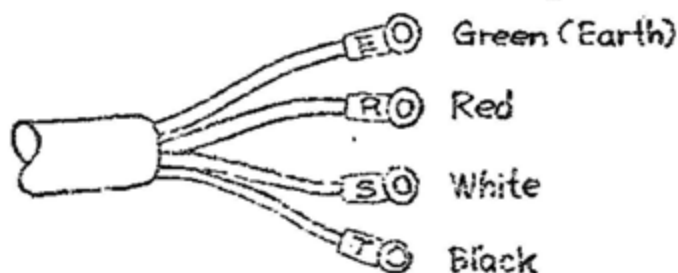
* Remove upper lid and nozzle cover.

1. Install clay rest to the bottom of nozzle with a fixing bolt as shown in fig.1.
2. Place pugmill in straight level.
Adjust levelling foot.
 - a. Loosen Nut M12.
 - b. Screw in adjustable foot to stop-end.
 - c. Screw out adjustable foot until wheel is levelled. Tighten the nut.



2 WIRING

Four wires ☆ This wiring is only for 3-phase.



To change rotation direction of screws, change connection only 2 wires out of Red, White, and Black to resume forward rotation (See fig. 3).

[fig.3]

3 TRIAL RUN

1. Fill out oil for vacuum pump, referring to the instructions, mentioned in the fig.4.

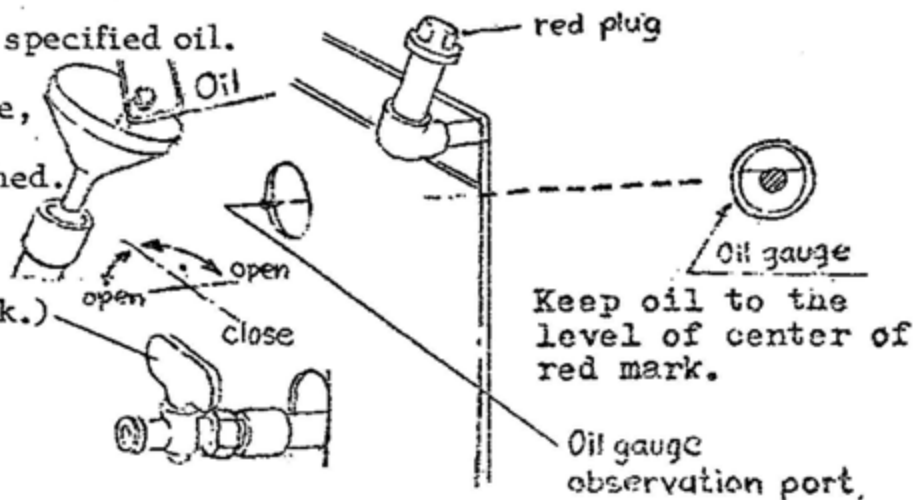
Do not use any other oil than the specified.
(See P.11 for the specified oil.)

[fig.4]

Fill the provided or specified oil.

Pour oil into the pipe,
and tighten red plug
when filling is finished.

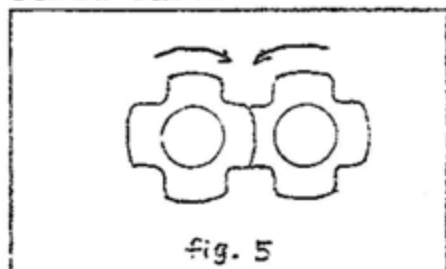
Peacock
(Please confirm the
tightness of peacock.)



2. Before going into trial run, confirm followings;

- * Confirm wiring is correct.
- * Check if oil is no obstacle (tools or wood pieces) in the screw case.
- * Confirm there is no children who may be got involved in danger.
- * See if there is no wobbling of pugmill.

3. Plug in. Switch ON(fig.1) to 2 from 0. Screws are to run toward inside of the screw case.



Change connections (see fig.3) in the plug to resume rotation of screws to right direction . See fig.5 for forward direction of screws.

4. Now that rotational direction is correct, continue running and see if there is no rattling sound. Trial run is completed.

5. After idling, switch OFF to 0 from 2 and plug off.

4 OPERATION

- * Keep hands off screw case while motor is running.
- * Do not throw stone, wood pieces with clay into the screw case.
- * Do not throw dried hard clay.
- * Do not throw in too-wet clay.
- * Do not throw in excessive quantities of clay.

- 1) Check again same all procedures in 3 - 2.
- 2) Plug in and turn switch 0 to 2.
- 3) Confirm pressure release valve is closed. See fig.6 p.5.
- 4) Throw clay little by little into screw case. Read section TO OPERATE BETTER P.1.
- 5) At first stage, clay may be extruded in many thin-thread shape, but soon become a normal cylindrical shape. This is the normal function of SHIMPO pugmill.

- 6) After clay becomes a normal cylindrical shape, please confirm 65-73 cm/Hg in the pressure gauge. See fig. 6.

- 7) Clay, extruded out of nozzle before the pressure gauge shows 65-73 cm/Hg, is not even consistent and air entrapped in it is not removed, so throw the clay into the screw case again.
- 8) If pressure gauge shows normal 65-73 cm/Hg, clay extruded is satisfactorily densified.
- 9) Cut clay in useful length for throwing on wheels. If only one pugmilling is not enough, mill same clay several times.
- 10) From your next operation, please follow procedures as below : First switch ON to 1 from 0. Please read pressure gauge 65-73 cm/Hg. Then, switch onto 2 from 1. At this time, confirm pressure release valve is closed tightly.

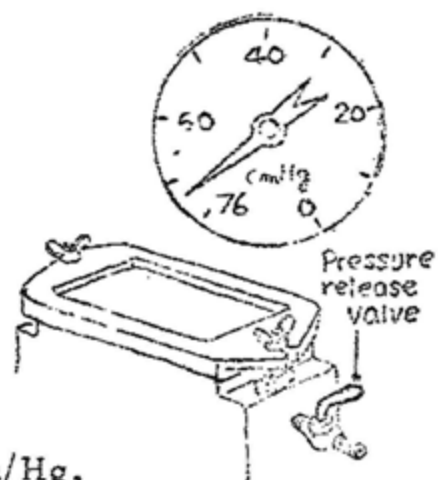


fig. 6

5 FINISHING OPERATION

1. When finishing operation, switch OFF onto 0 from 2; and pull out plug.
2. Open pressure release valve, then after confirming pressure gauge reads 0 in the scale, close pressure release valve. See fig. 6. When pugmill is not operated, please confirm 0 in the scale.
3. Place nozzle cover and upper lid to avoid clay becoming dry and dusty. If pugmill is left unused for a long time, pour water into screw case to keep clay wet, or soft.
 - * If pugmill is left unused, & clay inside of the pugmill become solid, remove this before operation.
4. After operation, Check following points:
 - * Switch is in 0 position.
 - * Plug is pulled off.
 - * Read 0 in pressure gauge.
 - * Front and upper lids are set.

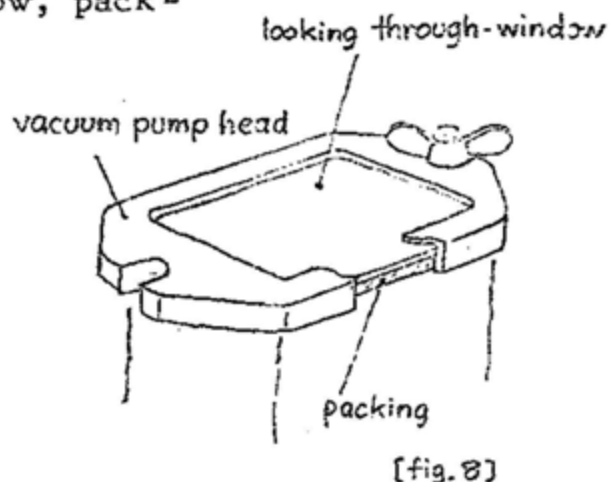
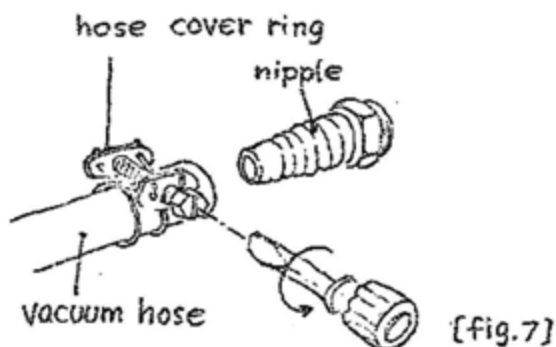
6 TO CLEAN INSIDE OF PUGMILL, FOLLOW ASSEMBLY & REASSEMBLY' BEFORE REASSEMBLE

1. Remove nozzle cover and upper lid and be ready for operation.
 2. Operate Pugmill to extrude as much as clay to clean inside of the Pugmill.
 3. At this time, clay will not come out of nozzle, then turn switch to 0 and pull out plug.
- * Before reassemble Pugmill, be sure to switch off to 0 and plug out, do not operate motor during reassembling. When re-assembling, be careful not to loose or mix parts with clay.

REASSEMBLE

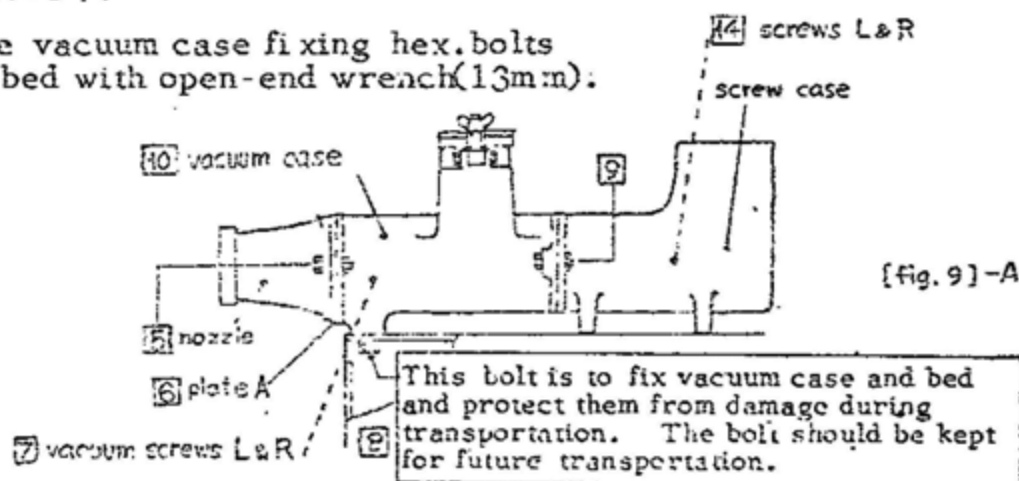
1. Remove vacuum hose cover ring. Pull out vacuum hose out of nipple, set on the bed of Pugmill. See fig.7.
2. Remove two wing nut to release vacuum pump head.

Remove vacuum pump head off screw case.
Note: Handle vacuum pump head with care, especially looking through-window, packings.



3. Unscrew hex. bolt to remove clay rest. Fig.1.
4. Remove two bolts to release nozzle with either allen wrench 13mm.

5. Remove nozzle off vacuum case. If nozzle is not removed smoothly, move nozzle top up and down a little.
6. Remove plate A.
Plate may not be removed smoothly. Move plate up and down a little to take clay off the plate.
7. Pull out vacuum screw L & R. If vacuum screws may not be taken out smoothly, remove clay on the tip of screws first, and pull out the screws. If procedure in 7 is hard to do, proceed to 8 before 7.
8. Release vacuum case fixing hex.bolts on the bed with open-end wrench(13mm):



9. Remove vacuum-case-and-screw-case-fixing-bolt with open-end wrench (13mm).
10. Remove vacuum case from screw case.
11. If procedure 7 is omitted, now that the vacuum case has been removed from the screw case, plastic or wood-hammer out the vacuum screws L & R from screw case side.
(note: Do not use metal hammer. Use mallet or plastic hammer.)
12. Clean all clay fixed on vacuum case.
13. Remove plate-B from vacuum case.
If the plate-B is hard to be removed, clear clay on the circumference of the plate and plastic or wood-hammer out it from screw case side.
14. Pull out screws L & R from screw case.
If the screws are hard to be taken out, clean clay around the screw ends first, and take them out, moving them up and down slightly.

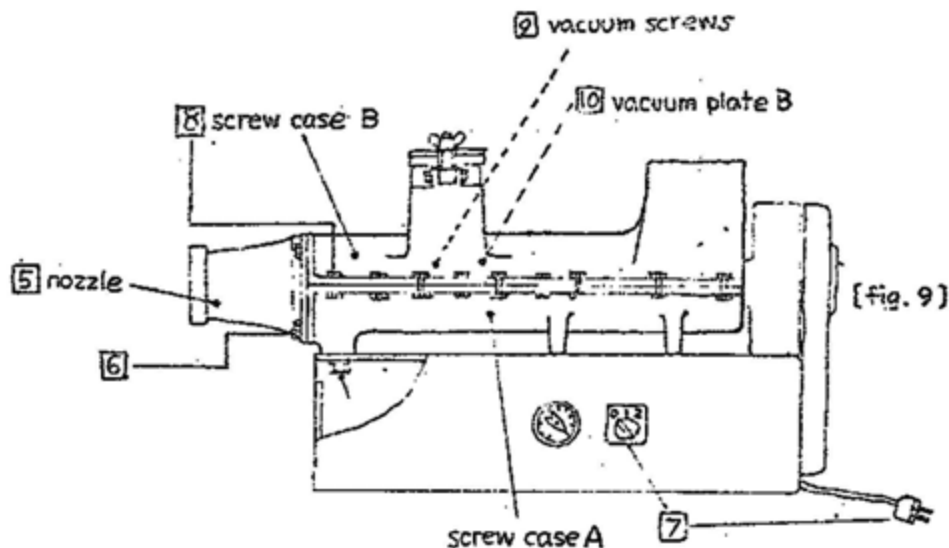
5. Remove nozzle off screw case.
6. Remove Hex.head screw-case-fixing bolt with wrench(17mm).
7. Plug in firmly again. Turn switch onto 0 (zero) from 2 and operate pugmill for one or two seconds to release screw case A from B. If screw case moves slightly upward, turn switch OFF to 0-zero and pull out plug.

Note: Pour some water into the hopper to make the hard clay, left in the pugmill, soft.

8. Remove screw case B.

Note: Handle carefully to keep the contacting surface of nozzle and screw case from damage.

9. Remove vacuum screw from screw case A.
10. Remove vacuum plate-B from screw case A.
11. Remove screws from screw case A.



[fig-9]-B

CLEAR WITH WATER

Before cleaning parts with water, take following points into consideration.

1. Clean gear case and bed with cloth. Do not use water.

NVA-07

2. VACUUM HEAD

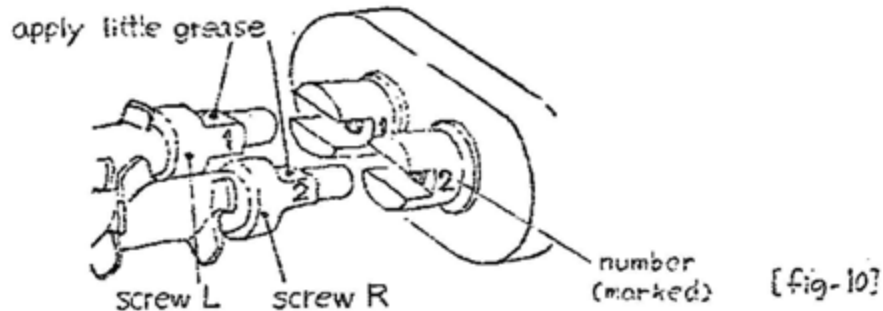
Clear bead with water, but keep water completely off vacuum hose and pressure gauge. Be sure no damage on sealing surface of looking-through-window of vacuum head. Be sure no damage on contacting surface of vacuum case, plate-B, & screw case.

NVA-15

2. Be sure of no damage on sealing surface of screw case B and looking-through-window, screw case A & B and nozzle, screw case B. Especially be very careful on sealing surface of screw case A and B for no damage. Any small damage will cause air-release, and this will not provide normal air vacuum pressure.

7 ASSEMBLY

1. Apply little grease on both ends of right and left standard screws and on couplings on gear case. Insert two standard screws into the couplings. As fig. 10 shows, adjust screws and couplings so that numbers engraved on them shall be the same. (If the right and left screws are fixed in the opposite position, clay will not be extruded from the nozzle but from hopper. Avoid this case.)



2. Set vacuum plate-B onto the screws. Be sure the extruded face side of the plate should come on the screw case side. See fig. 1 on P.2.
3. Apply little grease on both ends of right and left vacuum screws and insert two vacuum screws into the holes on the standard screw ends.

As fig. 10 shows, adjust screws and couplings so that numbers engraved on them shall be the same. If the right & left screws are fixed in the opposite position, clay will not be extruded from the nozzle but from hopper. Avoid this case.

(NVA-07)

4. Install vacuum case on the screw case and fix it with bolts.
5. Set plate A onto vacuum screws.
6. Install nozzle onto the vacuum case and fix with bolts.

(NVA-15)

4. Install screw case B on screw case A, adjust two cases A and B so that vacuum plate can snugly be fitted in.
5. Temporarily fix bolts on screw case A and B.
6. Install and temporarily set nozzle on screw case A and B with the fixing bolts.

NVA-07

7. Set clay rest to the bottom of nozzle with fixing bolts.
8. Install looking-through-window and frame on the vacuum head and fix with wing nuts.
9. Insert vacuum hose into nipple, installed on bed. See fig.7.
10. Check for firm fastening of all bolts so far.

Now that the assembly has been finished, proceed to the TRIAL RUN see [3] on P.3.

NVA-15

7. Set screw case A and B firmly with bolts.
8. Install nozzle on the vacuum case and fix firmly with bolts.
9. Set clay rest to the bottom of nozzle with fixing bolts.
10. Install looking-through-window and frame on the vacuum head and fix them slightly with wing nuts.
11. Insert vacuum hose into nipple, installed on bed, and fix it with the hose cover ring.

Note: If grease is applied on the nipple, hose will be removed smoothly when reassembling.
12. Check firm fastening of all bolts so far.

Now that the assembly has been finished, proceed to the TRIAL RUN on P.3. If everything is checked 'all right', the assembly has been completed.

8 EVERYDAY CHECKING POINTS

1. Vacuum pump (See section 'Vacuum Pump')

Use only specified oils for vacuum pump. See P.18.
Water or clay will be penetrated into oil of vacuum pump and will remain at the bottom of oil. The water should be removed from peacock once in 2-3 days. If oil is reduced, add and fill oil to the indicated quantity.

2. Filter

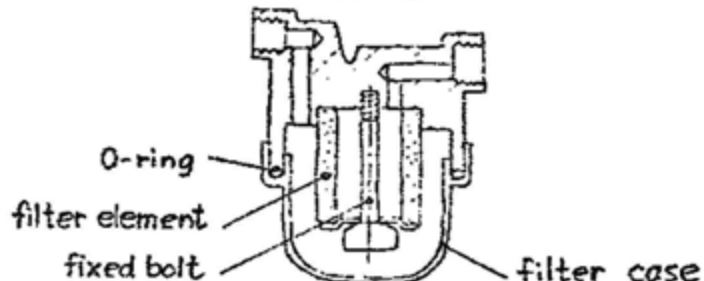
It is to prevent dirt being absorbed into vacuum pump. After a long-time use, dirt or clay stuck at the filter must be cleaned to preserve normal de-airing capability. At this time, although pressure gauge reads good de-airing, the clay will not be de-aired actually. To clean dirt or clay off the filter, follow procedures here;

1. Turn filter case in counter-clockwise direction to remove it, as fig.11 shows.
2. Turn fixing bolt in counter-clockwise direction to remove filter element.
3. Air or wash with soap filter element to clean dirt.
(If the filter element is washed with soap, dry filter element before fixing it again.

Note: ● Oil leakage of vacuum pump.

Water or clay will be penetrated into oil of vacuum pump and will remain at the bottom of oil.
If water releasing is not done, oil quantity will increase and exceed the indicated level in oil gauge.

The oil will be splashed out. To avoid this, release water once in every 2-3 days of use and fill oil to the recommended level in the oil gauge.



● Clay extruded in the vacuum head.

If clay comes out into the vacuum head, do not continue operating pugmill. Remove the clay before operating it again.

If clay comes into the vacuum hose, remove the clay. Do not continue operating pugmill. It will cause damage on pugmill.

SHIMPO DE-AIRING PUGMILLS

MODEL NVA-07/15 TROUBLE DISCRIMINATION & TROUBLE SHOOTING

TRouble	CAUSE	TROUBLE SHOOTING
Vacuum Pump Oil leakage	Water has been kept under the oil of vacuum pump after a long time of use. If water has not been released when oil level exceeds the usual level, oil will be splashed out of the vacuum pump.	(1) Release water kept in the vacuum pump. (2) Decrease oil down to the normal quantity level (at the lower level of gauge.)
Clay is penetrated into vacuum head.	(a) Too much of clay is taken in at a time. (b) Too soft clay is used. (c) Water is used and poured into hopper. (d) If de-aired, water drop will be on the inside wall of vacuum head. This will make clay soft on the inside wall of vacuum head.	(1) Decrease the quantity of clay you throw into the hopper. (2) Do not throw too soft clay into the hopper. (wet) (3) Do not pour water into the hopper. (4) Use a little hard clay (5) Clean inside of the vacuum head and release water regularly from the vacuum pump.
Noise from gear case & screws	(a) Grease between screw and joint parts is reduced. (b) Vacuum plate and screw coupling wear abnormally and/or be seized. (c) Abnormal wear and seizure of vacuum screw and nozzle.	(1) Apply grease in the connection between screw and gear case. (2) If Trouble Shooting (1) is not enough, check vacuum plate and bushings for abnormal wear. Replace them with new ones if necessary.
Vacuum pressure can not be raised to 70-73 cm/Hg.	(a) Pressure gauge is out of order (b) Imperfect sealing between nozzle and screw case A.B. (c) Imperfect sealing between packings and the looking-through-window of vacuum head.	(1) Extruded clay is de-aired well. After removing the looking-through-window, cover the air-intake opening to check if the pressure becomes high in the gauge. If not, the pressure gauge may be out of order.

Check for no air leakage.

Apply soap bubble on the checking part with brush, and see if soap suds will be drawn into the part.

(d) Imperfect pipings and others

- (2) Check for no dent on the contacting surface of nozzle and screw case A, B. If there is any dent, remove it with using emery paper.
- (3) Check for no dirt or clay on the contacting surface of screw case A, B. If there is any, clean them.
- (4) Check rubber packing for no damage. If necessary, change it with new one.
- (5) Check hose for no loosening. If loosened, tighten hose cover ring. If the vacuum hose is damaged, change it with new one.
- (6) Check filter for no loosening. If loosened, tighten it.
- (7) Check oil if it is clear or not. If not, the vacuum pump oil needs to be changed.
- (8) Check peacock for no loosening. If loosened, tighten it.

If above trouble-shootings would not remedy the damages of the pugmill, the vacuum pump needs to be overhauled. Contact the nearest SHIMPO or the distributor for the overhauling.

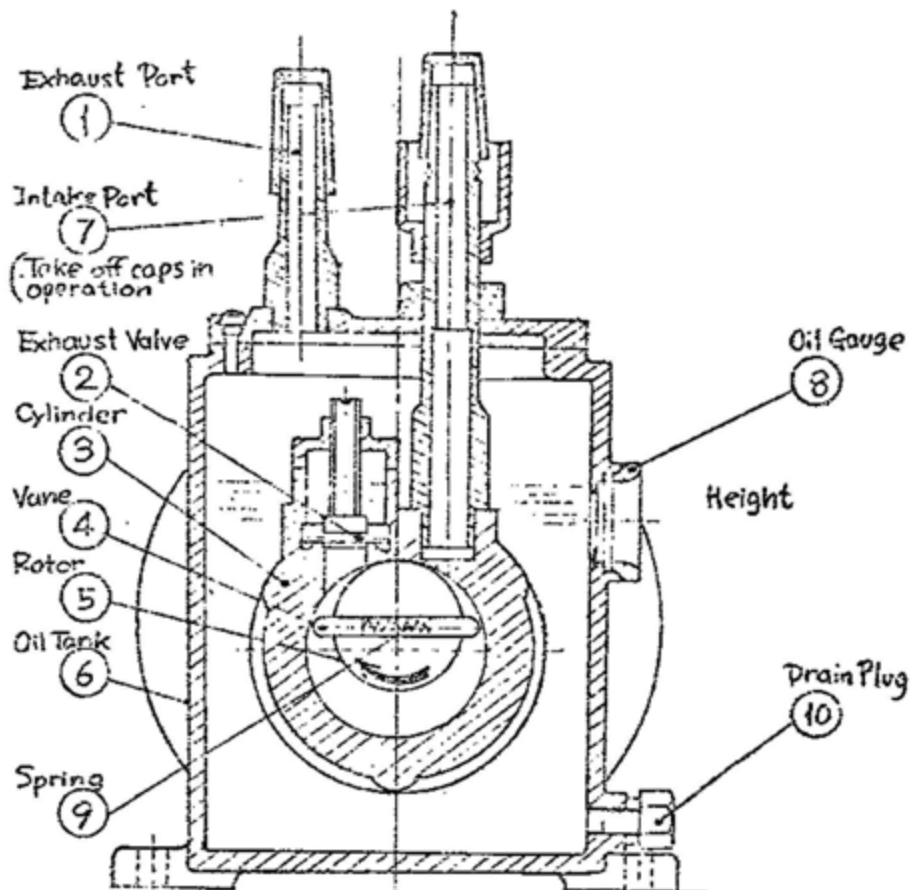
Pugmill does not work.	(a) Wiring is disconnected. (b) Switch is broken. (c) Motor is damaged. (d) Gear is damaged.	(1) For the causes (1) - (3), consult with an electric shop. If motor needs to be replaced, check amperage is within the rated value, and be strictly kept within the limited value during operation. (2) For the cause of (d), gears damaged needs to be replaced. Check amperage of load operation is kept within the rated value.
Belt is slipp- pery.	(a) Belt is loosened. (b) Belt is overhauled. (c) Belt holds water or oil.	(1) For the cause of (1), If the belt is broken, replace it with new one. Loosen motor-plate-fixing-bolts to slide motor plate for higher tension of belt. (2) Check amperage of load operation for no overload. Keep it within the rated value during operation. (3) Clean the belt off the water or oil.
Screw is broken.	(a) Any foreign matter is mixed in.	(1) Change the broken screws with new ones. If there is any abnormal sound of gears, change also the broken gears with new ones.
The quantity of clay out of nozzle extruded is small.	(a) Screw is worn.	(1) If the screws are worn and become small in size, change them with new ones. Normally, the size of the screws are as follows; Dia. of screw : 116mm Dia. of vacuum screw : 124mm (2) Too wet clay with decrease the capacity of pugmill. Use the harder clay for normal extruding capacity.

VACUUM PUMP OPERATION AND SERVICE MANUAL

STRUCTURE

Model CV series pumps are oil-sealed rotary vane type (Gaude), and are provided with rotor which rotates in the cylinder (3). The Rotor (5) is furnished with 2 Vanes (4), which press tightly to the internal side of cylinder with the tension of spring in rotation. The pump exhausts air twice per rotation through Exhaust Valve (2) when arched space is formed at the Intake Port (7) of pump.

They are featured to eliminate vibration, for the eccentric rotation is effecting only by sliding of light vanes. This renders to quiet operation of pump, particularly by the least puls beats of suction which caused from the cycle of suction doubled the speed of rotation.



Operation

[1] PREPARATION

- a. Fill pump with oil to the upper limit of oil gauge (8), and keep oil in proper quantity for best performance.
- b. For piping, use rubber vacuum hose and make it possibly shorter in length, and connect the hose of same diameter with intake port to save piping loss. Make every connection entirely air tight.
- c. Fix V-Belt rather loose but preventing slip of belt. Set direction of rotation clockwise faced at pulley side.

[2] START OPERATION

It is required to switch on by opening intake port of pump. It will sometimes happen hard starting because oil is becoming heavier in winter, and switch on intermittently helping rotation manually at the beginning.

[3] OPERATION

1. Do not operate pump in leaving intake port open for fear of effecting insufficient lubrication as well as giving any trouble to pump.
2. Oil will be atomized and blown off together with exhausting air due to plentiful suction of air at the beginning of operation at a low vacuum in the range of 760 - 25 Torr. It is required to let exhausting air outdoor with duct for avoiding oil dirt to be given to the plant.
3. If pump were making some irregular sounds, the causes are ; (1) exhaust valve might be damaged, (2) cylinder of rotor might be damaged by sucking in some corrosive gases, (3) moisture, dusts or powderies might be sucked into pump.
4. Install trap between chamber and pump for elimination of moisture or gas in order to prevent sucking them into pump.

[4] STOP OPERATION

Make pump free of pressure after off duty opening intake port. In case it needs to leave chamber under vacuum after off duty, install valve between chamber and pump and leak valve between the valve and pump. If the chamber were left under vacuum with no valves, it will cause restarting of pump hard due to filling cylinder up with oil, and the oil will flow back to chamber.

5. MAINTENANCE

1. Reduction of ultimate pressure is usually caused from quality of oil. Inspect oil and renew it if water were included in the oil.
2. Inspect exhaust valve, cylinder, rotor etc., whether they are damaged or not due to sucking some corrosive gases or poederies into the pump.
3. It needs overhaul if there were found any irregularities after every inspection. Use wooden hammer for overhauling and be careful to give no harm to every fitting face.

Recommended OIL for Vacuum Pump, of SHIMPO Pugmill Model NVA-07.

OIL COMPANY Brand Name	GRADE		
Operation Season/Area	In Winter or anti-freezing use	Standard	Use in hot area
* Idemitsu	DAPHNE AS-VAC No. 100	OP OIL Super R-68	DAPHNE AS-VAC No. 300
ESSO	VP OIL 56		
Shell	VITREA 33 or TALPA 20		VITREA 37 or TALPA 30
Turbine Oil	No. 90	No. 140	
Note: * shows recommended oil abroad. 1. Please use the recommended oil as much as possible. 2. Oil of smaller No. (i.e. Turbine oil 90, or the relevant) is better for use in Winter season, or for anti-freezing use.			