

## TECHNICAL SPECIFICATIONS

### SWIVEL ARM GRINDING MACHINE

#### 1. PURPOSE :

The Grinding machine is required for taper grinding of the Root and Shroud of the Turbine blades within close tolerances during assembly of the Blades. The Blades will be assembled in steam turbine Rotors and Casings of various ratings. Blades material shall be Martensitic stainless steel grade DIN X22 Cr MoV 121 having tensile strength up to  $900 \text{ N/mm}^2$ .

#### 2. SPECIFICATIONS:

##### 2.1 HORIZONTAL TABLE:

- A) Size of sine table (Length \* Width) - Min. 480 \* 290 MM
- B) Number of T-Slots - Min. 2 Nos.
- C) A Sine table shall be mounted on the Machine table. Mechanism to clamp and set the sine table to be provided.
- D) A Electro-magnetic table of size 400 \* 200 mm shall be mounted on the sine table. The machine shall be supplied with Sine table and Electro – magnetic table of reputed make. Make of the Sine table and Electro-magnetic table shall be informed by the vendor.
- E) The Electro-magnetic table shall have the provision of magnetizing and demagnetizing. Magnetizing power of the magnetic table should be sufficient enough to hold the turbine blades during grinding while taking heavier cuts. In case of sudden power failure, sufficient time lapse should be available before demagnetization of the table takes places. Suitable safety guards should be provided all around the machine table.
- F) During grinding operation, the depth of cut shall be given by the vertical movement of the machine table.
- G) Min. possible vertical movement of the machine table shall be 0.005 MM through manual feed only.
- H) Max. safe weight on table. - To be informed by the supplier.

##### 2.2 GRINDING SPINDLE WITH VERTICAL AXIS:

- A) Base Speed - 1500 RPM ( Fixed)
- B) Grinding wheel diameter - 300 MM
- C) The Grinding wheel shall be segmental type having 14 grinding segments around the periphery.
- D) The Grinding segments shall have Aluminum root with hexagonal nut, size 32/64 \* 48.4 \* 50 & Grade 30A24 – 1D18V4.
- E) Swivel of Grinding head shall be manual only. Suitable handle to be provided on the grinding head arm to swivel the grinding wheel over the surface of the magnetic table.
- F) The Grinding area covered shall be the complete surface of the Electro-Magnetic table 400 \* 200 MM.
- G) Distance between the grinding wheel and Magnetic table surface shall be 0 – 325 MM.
- H) Suitable arrangement for changing of the grinding wheel to be provided.
- I) Swivel arm should have a balanced smooth jerk free movement on its axis.
- J) The machine shall be supplied fitted with the Grinding wheel & Segments.
- H) Wheel dresser to be provided at suitable location.

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### 2.3 POWER :

- |    |   |   |             |
|----|---|---|-------------|
| A) | Main Motor  | - | Min. 7.5 HP |
| B) | Coolant pump motor  | - | Min. 0.5 HP |
| C) | Discharge of the coolant pump at max. height of spindle face (Lit./min) | - | Min. 50 lpm |

### 2.4 SPACE REQUIRED :

- |    |   |   |                                 |
|----|---|---|---------------------------------|
| A) | Length * Width * Height<br>(Including all possible movements and adjustments) | - | To be informed by the supplier. |
|----|---|---|---------------------------------|

### 3. ESSENTIAL FEATURES / REQUIREMENTS:

- A) The basic machine shall have a robust and vibration free construction and high power rating to ensure accurate grinding of the blades.
- B) Main Motor should be of reputed make i.e Siemens, ABB, Crompton Greaves, Baldor & Kirloskar. Main Motor starting should be through Star-Delta through contactor-timer logic incorporated in the control panel.
- C) Motors should be protected against over – heating. MPCB (Motor Protection Circuit Breaker) having single phase protection should be provided for all motors.
- D) In electrical panel all accessories should be of reputed make i.e Siemens , ABB, Telemecanique , Control & switchgear and L&T.
- E) The machine should have working light at suitable location with on-off switch.
- F) The electrical control panel should be dust and vermin proof and located at suitable place for maintenance.
- G) Machine should have push - buttons controlling the different function of machine. Devices should be protected against short – circuiting with proper safety measures.
- H) The coolant recirculation / recovery system should have a sump at a suitable location in the machine. The coolant pump should start and stop along with spindle. However separate switches is to be provided to switch off the coolant pump independently also.
- I) Guards around the working area of the machine shall be provided to ensure that undue coolant does not drench the operator during operation.
- J) Suitable lubrication system to be provided.
- K) Standard operation and service tools shall be supplied along with the machine.
- L) The machine shall be supplied with complete electrical equipment ready for the connection to the power mains. 20 meter armoured 4-core Power supply cable for connection from the machine to the power mains switch to be provided by the party.
- M) Supplier to provide first filling of all oils & lubricants required for the machine. Vendor to also inform Equivalent Indian grades of oils and lubricants.
- N) 5 sets of Operation and Maintenance manuals & Complete Electrical drawing of the machine and its control to be supplied in English language along with the machine.
- O) Sound level should be less than 80db.

### 4. COLOUR :

- A) Colour of the machine shall be Apple Green according to RAL.

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5. **PRE- DESPATCH INSPECTION ( PDI )**

- A) Provisional acceptance of the machine will be made by BHEL team at supplier's work prior to dispatch to ensure compliance with the specifications and proper functioning of the machine. This will be at the discretion of BHEL.
- B) Cost, if any, for the PDI to be indicated separately by the vendor.
- C) Suggested duration of PDI also to be indicated by the supplier.

6. **COMMISSIONING AND ACCEPTANCE :**

- A) Civil works will be in the BHEL's scope. The foundation drawings shall be supplied by the party.
- B) Final acceptance shall be made at BHEL, Haridwar following successful erection, assembly, test run and commissioning. Achieving specified accuracy and surface finish on a test job shall also be part of successful commissioning. Suitable test job to be arranged by the supplier.
- C) Test / Geometrical accuracy charts for testing the machine shall be supplied along with the machine.
- D) The vendor shall impart training to BHEL personnel in operation and maintenance of the machine during installation and commissioning.

7. **SPARES : ( As applicable )**

- A) Following essential spares to be provided along with the Machine :

**Mechanical Spares**

• Lead screw and nuts	-	1 Set
• Grinding spindle bearings	-	1 Set
• V – Belts	-	1 Set
• Swivel arm head bearings	-	1 Set





**Electrical Spares**

• Main Motor	-	1 No.
• Coolant Motor with pump	-	1 No.
• Push Button	-	5 No. each type
• Selector Switch	-	5 No. each type
• Contactor/Relay	-	2 No. each type
• MCB/MPCB	-	2 No. each type
• Mag.-Demag. Controller Unit	-	1 No.
• Timer	-	5 Nos. each type

- B) **Optional Spares:** To be recommended by the vendor for 2-years trouble free operation of the Machine. Cost of each spare to be indicated separately.

8. **GUARANTEE :**

- A) The vendor shall offer performance guarantee of the machine for 18 months from the date of final acceptance.



**TECHNICAL SUPPLY CONDITION:**

The machine should be able to operate in following technical conditions :

- POWER:

Machine should be suitable to operate on 3-phase A.C. supply of 415 Volts  $\pm 15\%$ , 50 Hz  $\pm 3\%$ .

• **ENVIRONMENT :**

Tropical environment consists of dust-laden atmosphere during some part of the year.

Temperature	-	Minimum 3°C
	-	Maximum 45°C
Relative Humidity	-	95% Maximum.

**QUALIFYING CONDITIONS:**

The supplier should be a reputed original manufacturer of Grinding Machines.

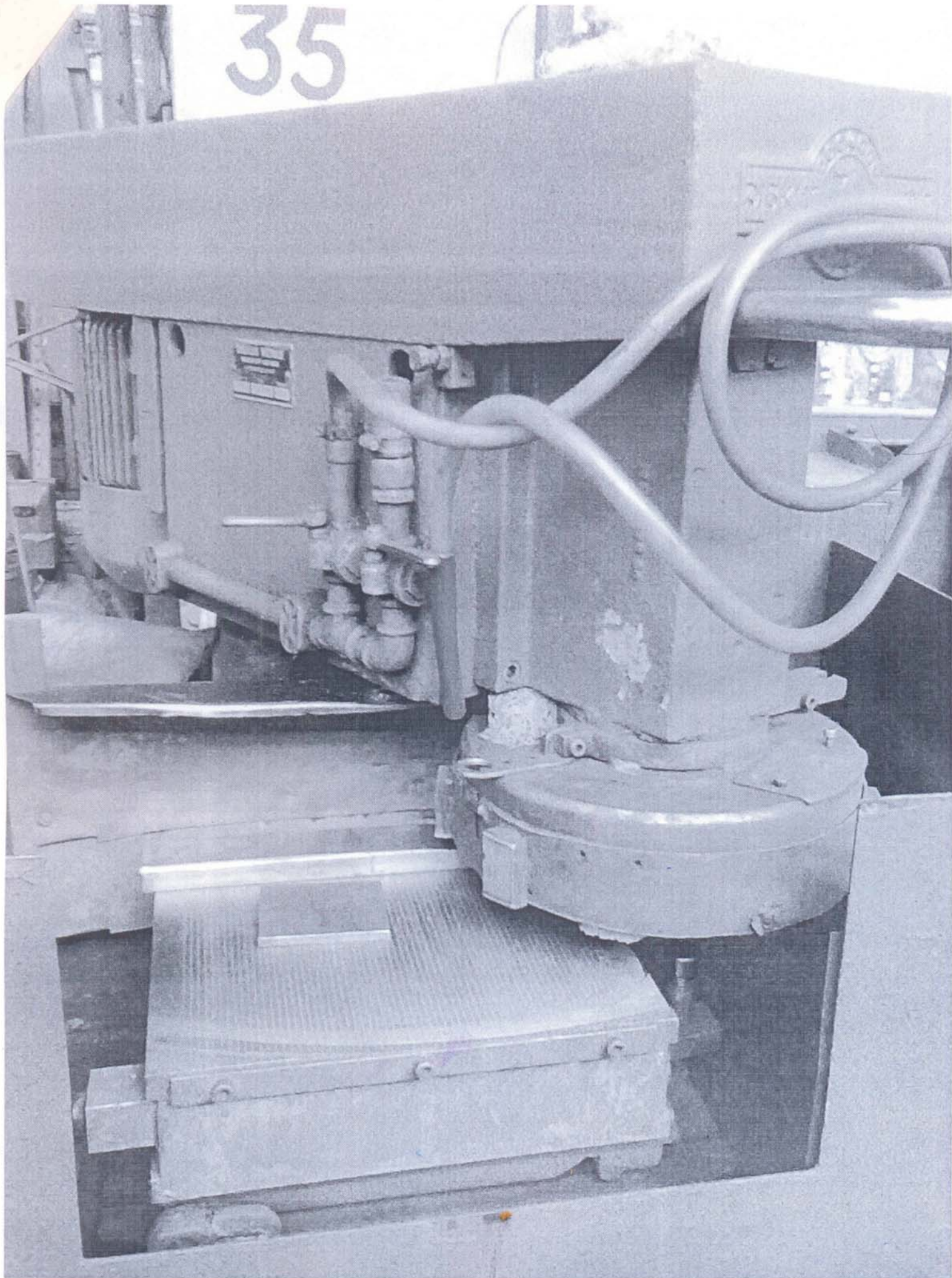
Similar to our specification ✓  
List of ~~similar~~ machines supplied during last 5 years to be provided by the Supplier alongwith full contact addresses of the customers and the year of s

This is special purpose machine. Some photographs of the existing machine are attached for reference only.

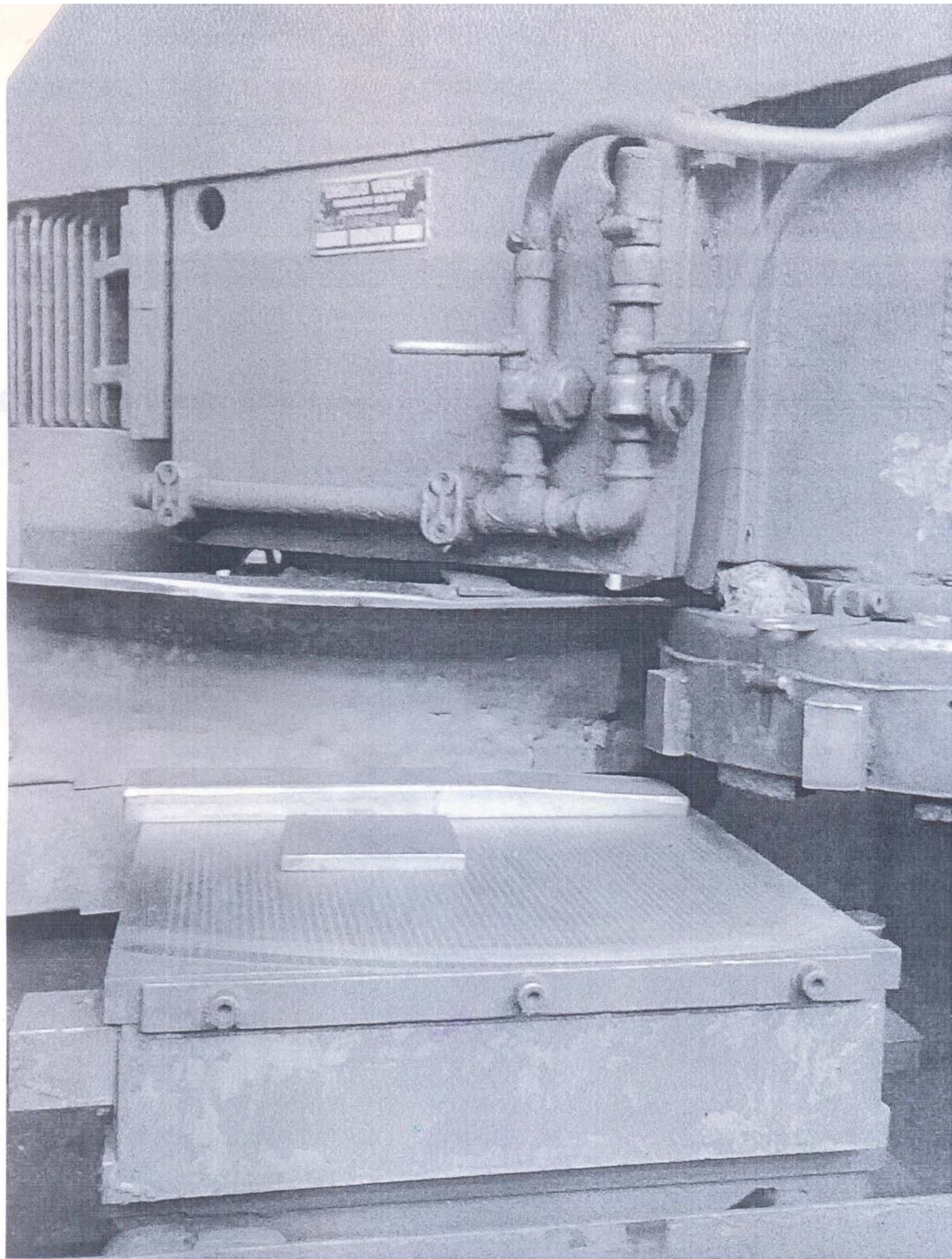
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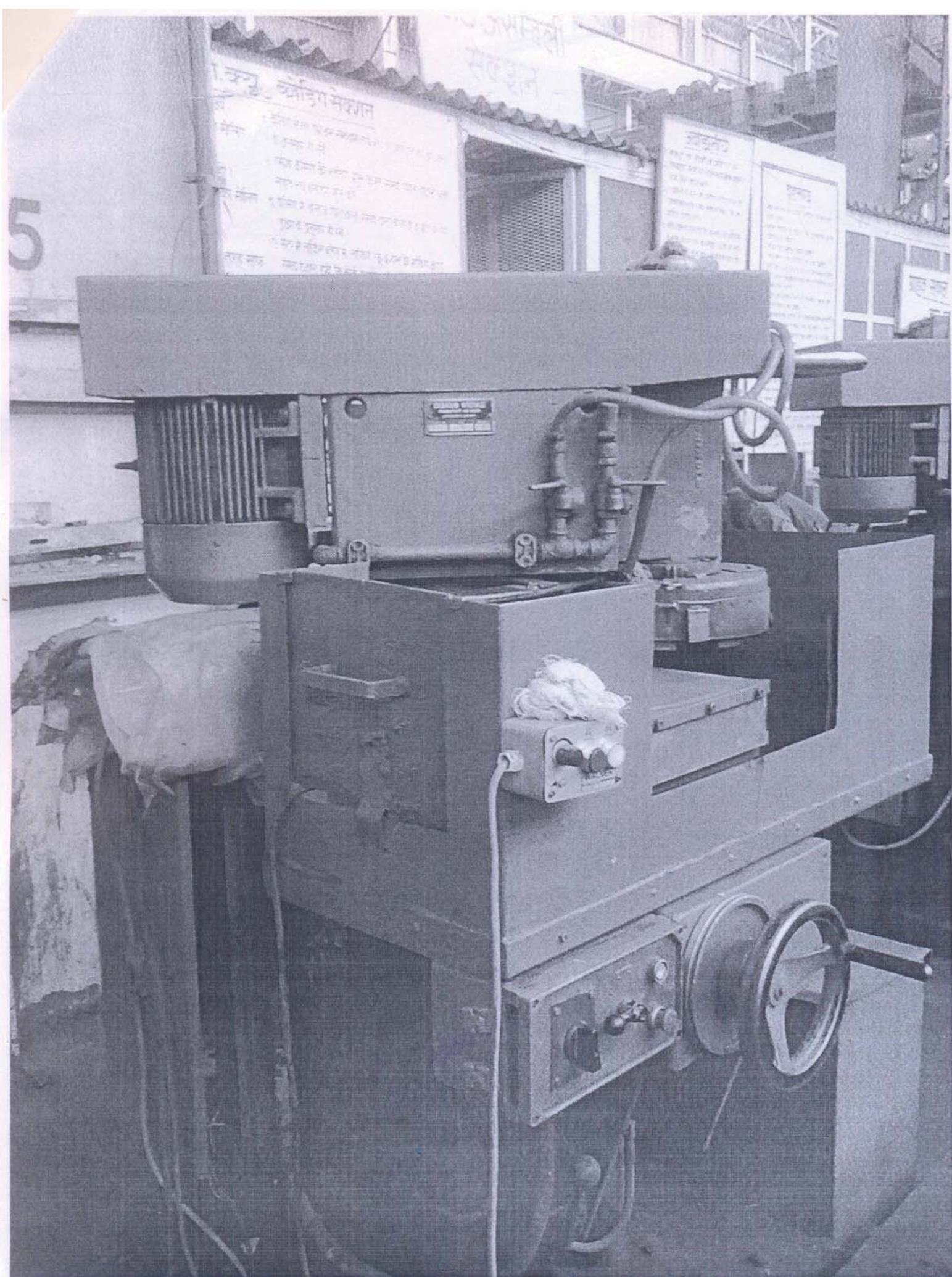




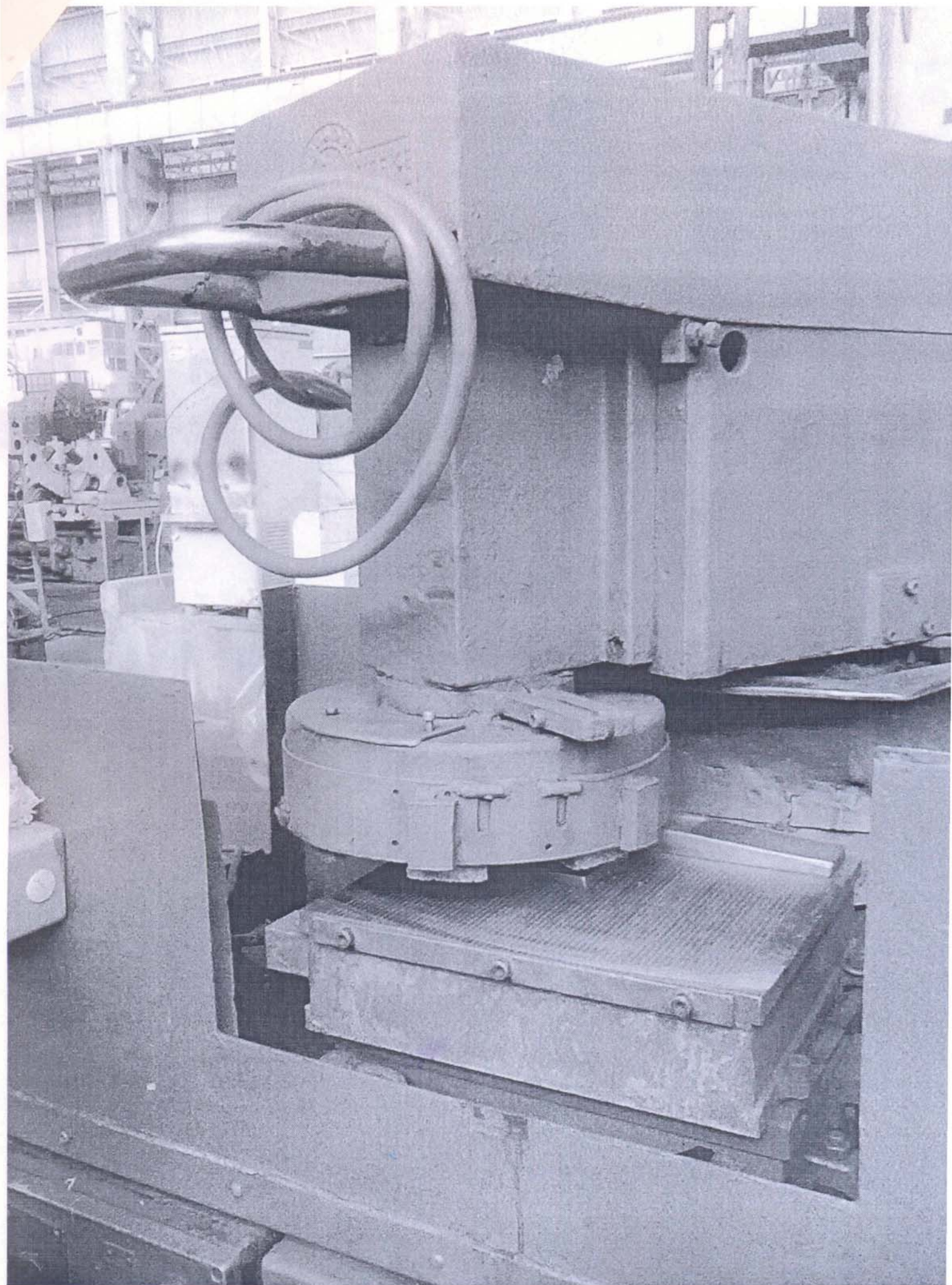




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