OPERATING INSTRUCTIONS AND REPLACEMENT PARTS LIST BAR BENDER

MODEL BO 32

Valid as from Serial No.

OPERATING INSTRUCTIONS

REPLACEMENT PARTS LIST

I. General

With the acquisition of the Mubea Bender you have obtained a high-performance bending machine developed in line with all that is best in modern practice in close co-operation with a large number of experts in this field.

The rugged design of the machine matches the operating requirements of the industry and the bender is simple to operate, thus ensuring fast, safe and reliable performance. The description given on this and the following pages is intended to help you get acquainted with the machine so that you can take full advantage of its efficiency and obtain the same satisfactory results all other users already enjoy.

The replacement parts list shows exact details of individual parts and their part numbers in order to familiarize you with the interrelated functions of the various components and, in addition, to eliminate any inquiries or ordering of replacement parts.

The operating instructions refer to part numbers which are identified in the replacement parts list.

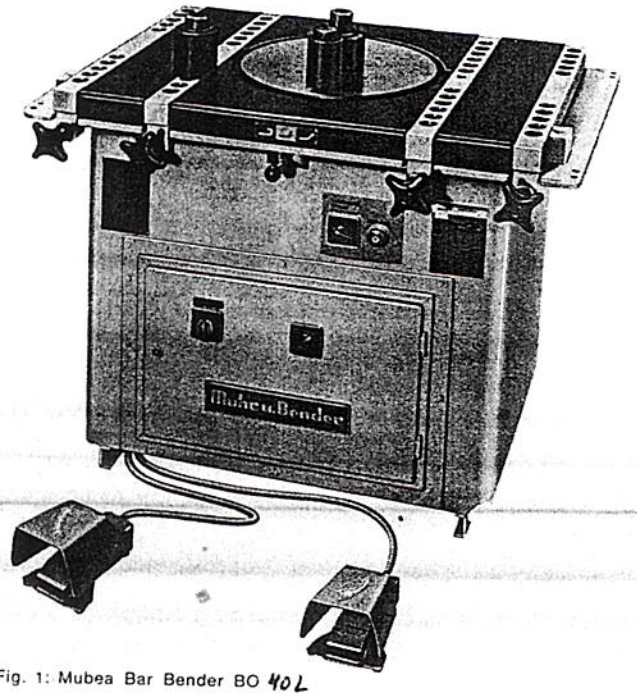

Fig. 1: Mubea Bar Bender BO 40 L

II. Electrical Connection and Start-up

1. Electrical Connection

If not required in another execution the machine is supplied with brake-motor 1,5/2,3 HP, 380 Volts, 3 phases, 50 cycles and ready for line-connection.

Check the supply voltage to ensure that it is the same as the operating voltage of the machine.

All work within the switchgear cabinet must be performed by a qualified electrician.

Additional protective measures must be taken in respect of increased shock-hazard voltage.

All that is required to make the machine ready for operation is to connect the power supply lead to the plug type connector with the bender.

Particular attention should be paid to proper grounding of the unit.

The machine ist protected by the main switch (Fig. 3). The motor is protected by a thermal control which switches off the motor automatically if the temperature rises excessively. At the same time the control circuit is broken and the contactors neutralized. After the motor has cooled down again the machine is ready for further operation – without any intervention on the part of the operator.

2. Direction of Rotation

After the machine has been connected to the power supply the direction of rotation of the power connection should be checked. It should turn in the direction indicated by the arrow on the foot-operated switch.

If the direction of rotation is incorrect, polarity should be reversed, i.e. two wires of the mains connection should be changed over.

3. Bending Line

For efficient operation it is advisable to install a run-out table on the left of the bending machine for easier handling of bar stock and, for better support and guiding, a bending table on the right. In small operations the cutting table can be simultaneously utilized as run-out table. The top of the bending table must be level with the top of the turntable.

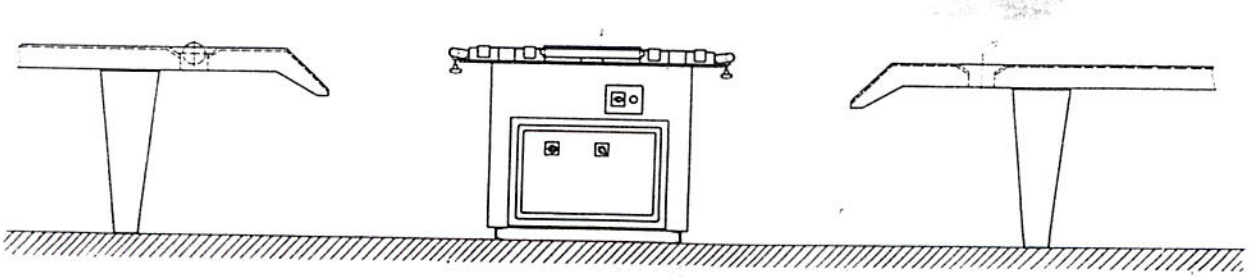

Fig. 2: Bending Line

III. Operating Controls

Rotation of the turntable is controlled by a movable foot-operated switch 305 which can be placed in the position most convenient for the operator. The turntable rotates in the direction indicated by the arrow on the foot-operated switch.

The speed selector switch 272 on the front panel of the machine permits 2 turntable speeds to be set. The slow speed of 9 rpm (switch position 1) is recommended for heavy bar material and intricate bends. The fast speed of 18 rpm (switch position 2) should be employed for work involving light bar material.

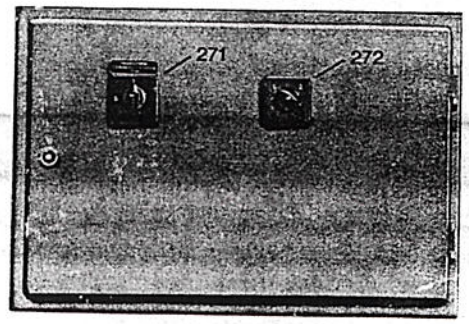

Fig. 3: Main Switch and Speed Selector Switch

With the selector switch 296 set to position 1 **(Automatic)**, the turntable, controlled by the foot-operated switch, rotates towards the pre-set bending angle and then automatically returns to the sarting position.

With the selector switch 296 set to position 2 **(Manuel)**, automatic return of the turntable is switched off. The trip dogs remain in the turntable but are not effective. The turntable continues to rotate as long as the foot-operated switch is pressed.

With the selector switch 296 set to position 3 (Continuous) the turntable continues to rotate after the foot-operated switch has been actuated until the stop switch 298 is pressed. The stop switch also stops the operation when the selector switch is set to automatic.

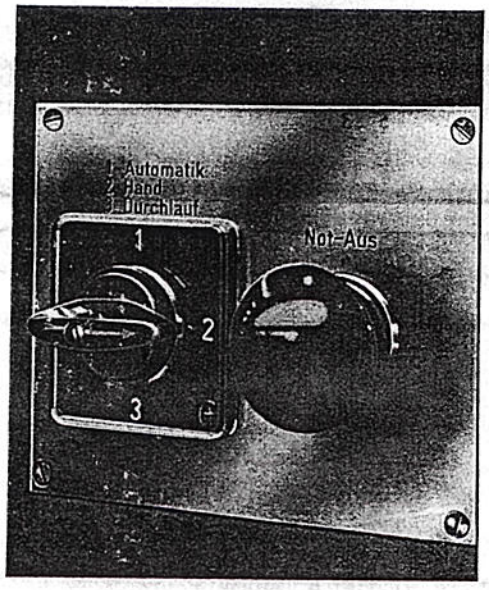

Fig. 4: Control Panel

If the machine has been operated with switch position 2 (Manual) or 3 (Continuous), the turntable must be returned to the zero-position (see Figs. 5 and 6) before switch position 1 (Automatic) is selected.

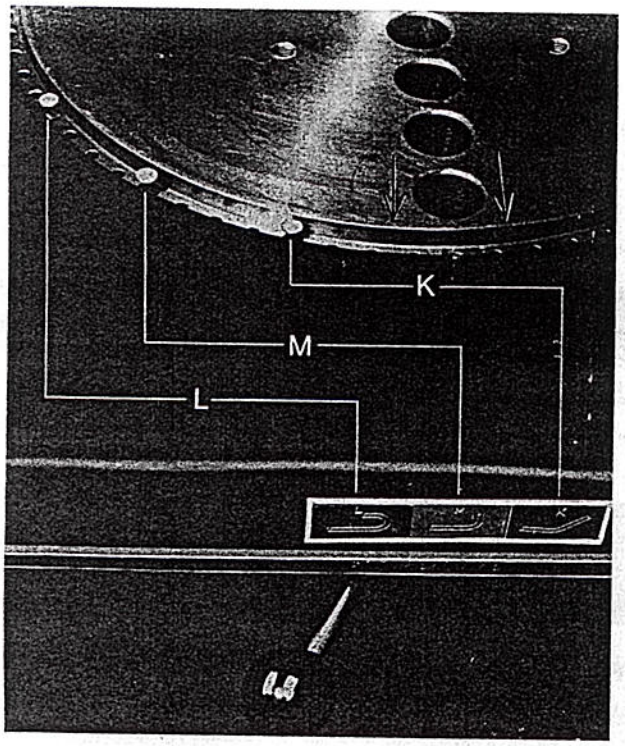

Fig. 5: Trip Dogs

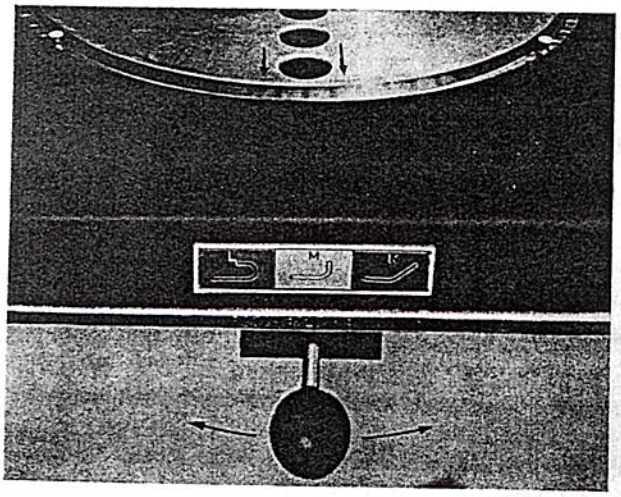

Fig. 6: Control lever for Adjustment of Bending Angle

IV. Setting of Bending Angle

Around the entire perimeter of the turntable are holes which take the trip dogs of defferent lengths, marked as follows:

K	–	short green	–	Part No. 124
M	–	medium	– yellow	Part No. 125
L	–	long	– blue	Part No. 126

In order to ensure proper functioning of the controls it is important that the trip dogs be inserted in the above sequence and that care be taken to insert trip dogs controlling clockwise rotation in the left half and trip dogs controlling counter-clockwise rotation in the right half of the turntable.

The trip dogs work in conjunction with the lever controlling the bending angle setting (Fig. 5). The dial plate of this lever is marked in the same way as the trip dogs. Trip dog K initiates reversal in lever position K, trip dog M in lever position M and trip dog L in lever position L.

Once the trip dogs have been inserted, pre-selection is effected by shifting the ball-handle lever to the left or right (Fig. 6). The positions of the trip dogs should be determined by a number of trial bending operations. The precise setting to offset the pitch of the holes accommodating the trip dogs is obtained by means of the infinitely adjustable overarm bars.

When the machine is operating on "Manual" or "Continuous" the bending angle adjustment mechanism remains inoperative, i. e. the trip dogs may be left in the perimeter holes of the turntable.

When selecting carrier bolt and rolls, care must be taken to ensure ample clearance between bar stock and carrier to prevent the latter picking up the bar during reversal.

V. Specified Bending Diameters

Every country has special regulations covering the working of reinforcing steel which prescribe the admissible bending diameter for specific bar diameters.

In the Federal Republic of Germany these regulations are laid down in DIN 1045 by the Committee for Reinforced Concrete. The prescribed diameters are minimum values and may not be undershot.

A principle that should be observed at all times is that heavy, hard steels should be bent slowly and light, soft reinforcing bars can be bent rapidly.

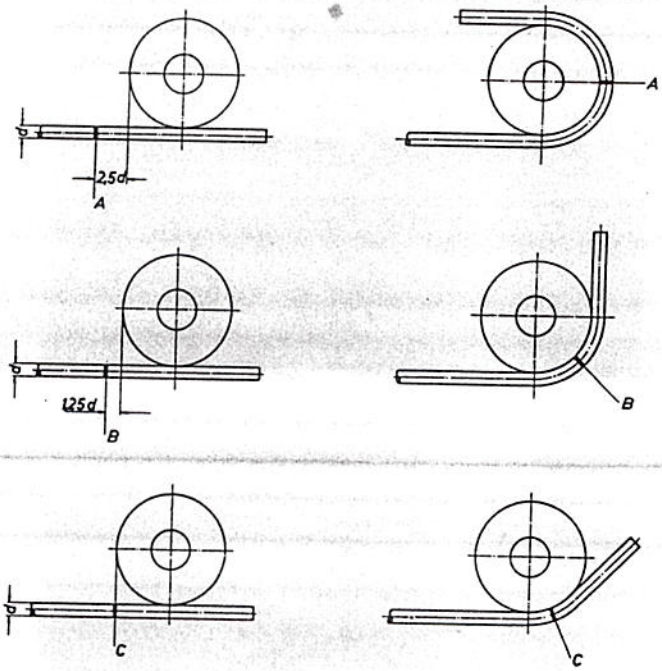

Fig. 9: Marking of Bar Stock

VI. Capacity

Model		BG 40L			
		1	2	3	4
Quantity of rods or bars	max.	mm inch	mm inch	mm inch	mm inch
Single bends reinforcing bar	450 N/mm² 65000 psi	40	30	25	22
	650 N/mm² 90000 psi	32	25	22	20
	850 N/mm² 120000 psi	32	25	20	18
Double bends reinforcing bar	450 N/mm² 65000 psi	30	22	20	18
	650 N/mm² 90000 psi	25	20	18	16
	850 N/mm² 120000 psi	25	18	16	14
Maximum bending height	mm/inch	Without Bending Arm 550/21½			
		With Bending Arm 1550/61"			
Turntable speed	RPM	9/18			
Driving rating	kW	1,5/2,5 – 380 Volt – 50 Cycles			
Net weight	kg/lbs	530/1170			
Gross weight – seaworthy packed	kg/lbs	785/1730			
Case measurements	m/inch	1,45x0,94x1,15/57x37x45			

Fig. 7: Capacity Schedule

VII. End Hooks and Plain Bends

In Order to obtain dimensionally true bending, bar stock should be marked as shown in Fig. 9. Allowance must always be made for the fact that the machine tends to pull in bar stock during the operation.

An end hook or upward bend is obtained by the following procedure: Since the bending process is initiated by rotation of the turntable, the 2″ diameter pin should be placed in the centre of the turntable with a roll (a) of a diameter suitable for the requirement slipped over it. A 2″ diameter carrier pin, with roll if necessary, should be placed in such a way that the bar stock will not become-omit "on any account" as there would otherwise be **the risk of an accident occurring during reversal.**

A 2″ diameter pin with roll (c) inserted in the overarm retainer bar located at the side of the turnable serves as overarm. In order to provide for matching of the overarm to the various bar diameters and/or roll diameters, the overarm retainer bars are infinitely adjustable.

Once the machine has been switched on for operation (clockwise or counter-clockwise), the rotating turntable bends the bar around the roll located in the centre of the turntable. Height of the roll and the performance of the machine permitting, a number of bars can be tacked and bent in the same manner.

If steel bars of diameters below ¾″ are to bent, the overarm bracket for light bars (150), Fig. 11, placed over the 2″ diameter pin, can be used instead of an overarm roll. A second 50 mm diameter pin secures the overarm bracket for light bars to prevent if from shifting. Setcrew (151) locates the device in the proper position.

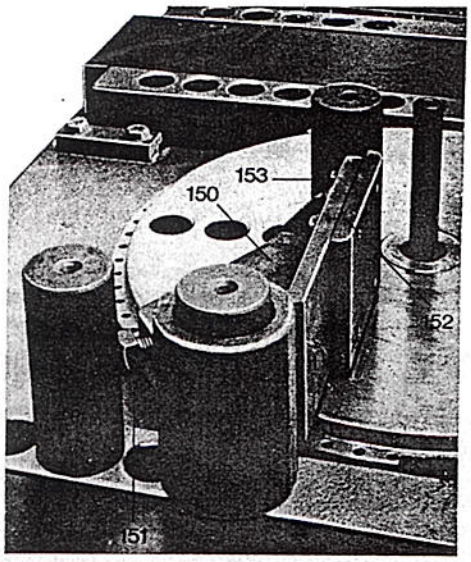

Fig. 11: Overarm bracket for light bars

The overarm bracket for light bars has a replacable wearing plate (152) held in position by screws (153) on the bracket.

The rotation arrangement provides for the elemination of accidents in the event of the turntable being rotated in the wrong direction; the carrier pin shifts the overarm bracket away from the centre of the turntable. This rotatability offers the further advantage of eliminating shifting of the overarm bracket from the left to the right side of the turntable and vice versa. Two overarm brackets for light bars are used instead, i.e. one on the left and one on the right overarm retainer bar. This arrangement provides for the overarm bracket for light bars not required for a particular bending operation to be swung back and placed in the non-operative position.

When working with large bending rolls more than 10″ in diameter which do not permit direct operation on the turntable, bending arm 190 should be used.

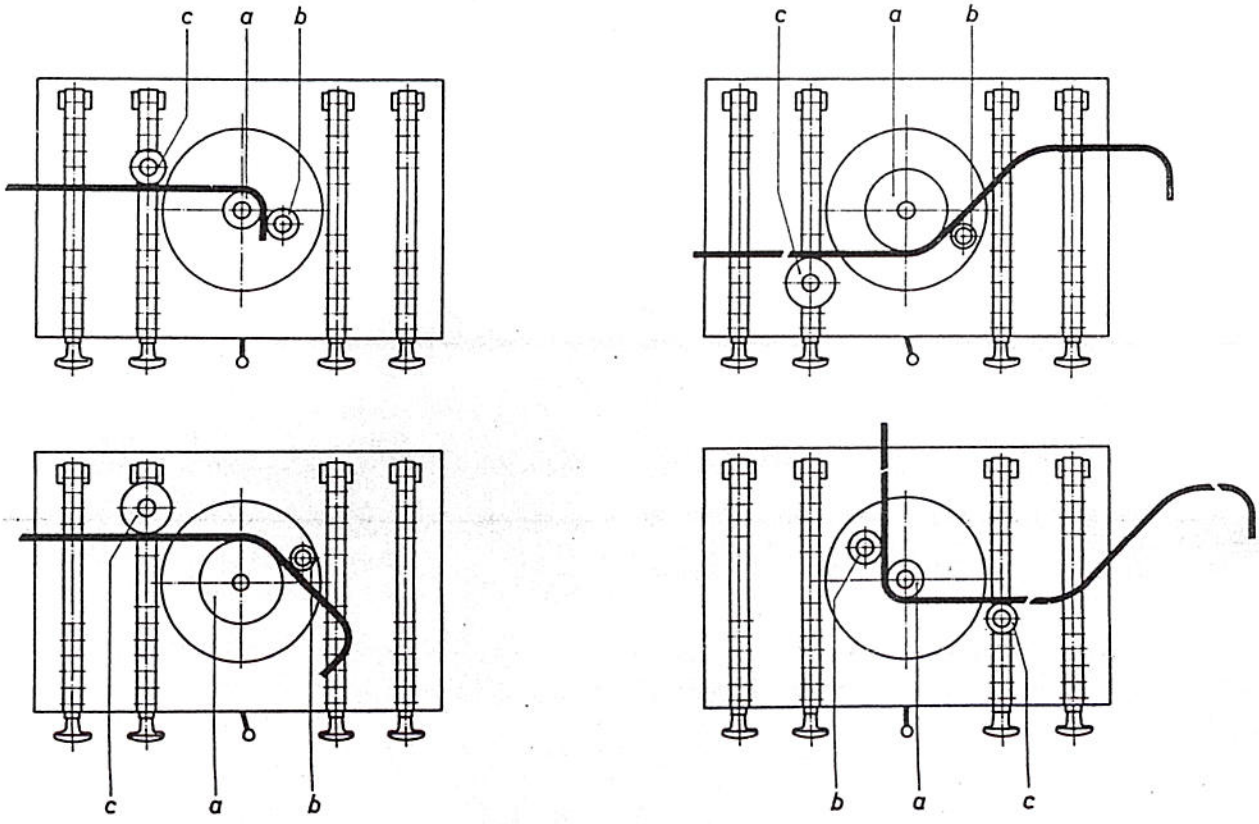

Fig. 10: Bending a full length bar

VIII. Bending in Two Directions

Double bends are produced by using the turntable (Fig. 12) or the bending arm (Fig. 13) available os optimal equipment. Elliptical bending rolls (Fig. 13) may be employed instead of the standard bending rolls. Rolls located by means of pins inserted into the inner or outer overarm retainer bars serve as stops. Bending operations around (Fig. 13) or away from (Fig. 12) the centre of the table are possible.

The stops are infinitely adjustable to any distance between legs up to 13¾" without the use of the bending arm and up to 22" with the bending arm being used (optional extra). As shown by Figs. 12 and 13, the bending arm, the elliptical bending rolls and the bending rolls with pins should be fitted to the turntable and overarm retainer bars respectively.

When working with the bending arm the overarm pins below the rolls should be fitted with spacers (193) (Fig. 13).

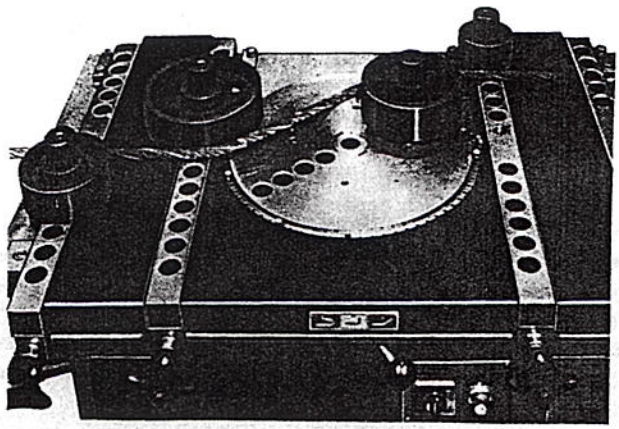

Fig. 12: Set-up for a double bend without the use of a bending arm away from the centre of the turntable

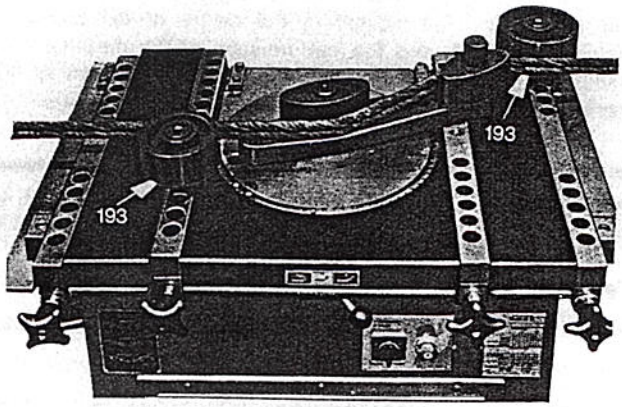

Fig. 13: Set-up for a double bend, using the bending arm, around the centre of the turntable

IX. Stress Members

Stress members and angular coils are manufactured with the aid of the angular bending attachment (optional extra). This consists of the guide bar with stop blocks and the stops. The layout of the angular bending attachment is shown by Fig. 14. The bending pin, the carrier pin, any rolls that may be required and the overarm bracket for light bars are set up in the usual manner. The guide bar with its stop blocks is inserted into one of the holes in the outer overarm retainer bar. The hinged stops can be shiftet on the guide bar to correspond with the varying lengths of the legs and are locked in position by a wing bolt.

The required dimensional regularity can be obtained by angular adjustment of the pins or dimensional adjustment by shifting the stops.

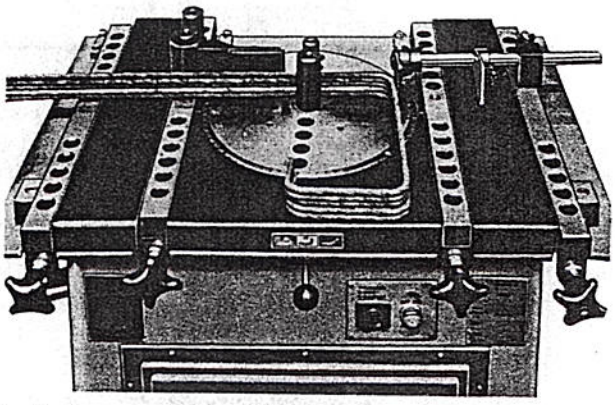

Fig. 14: Stress member bending attachment

X. Circular Coils and Bow Members

All standard equipment components are to be removed from the bending table for the manufacture of circular coils and bow menders.

Also remowe the centre panel (93).

Screw the drive shaft assembly (228 – 232) into the centre of the turntable. Insert the spindle housing assembly (205 – 227) with its two anchor bolts into the holes provided in the overarm retainer bar and then screw it onto the cover plate. Screw the pitch adjusting arm assembly (237 – 242) into the right-hand overarm/retainer bar and set to the desired pitch.

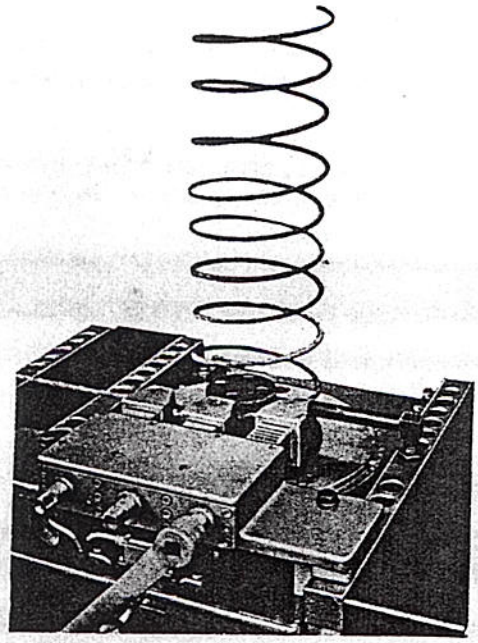

Fig. 15: Set-up for making coils

The Bending Process:

Set the selector switch 296 to position 3 (Continuous). Introduce the bar stock from the left and advance the center roll of the spindle housing by means of the crank (234) until the bar stock comes into firm contact with the drive roll (231). Advance the left-hand roll, which acts as overarm roll, until the bar stock runs parallel to the edge of the bending table.

Set to the desired coil diameter by adjusting the right-hand roll. Carry out a trial bending operation. In order to maintain regular coil diameter, the roll guide for the coiling roll support (218) is provided with a graduated scale.

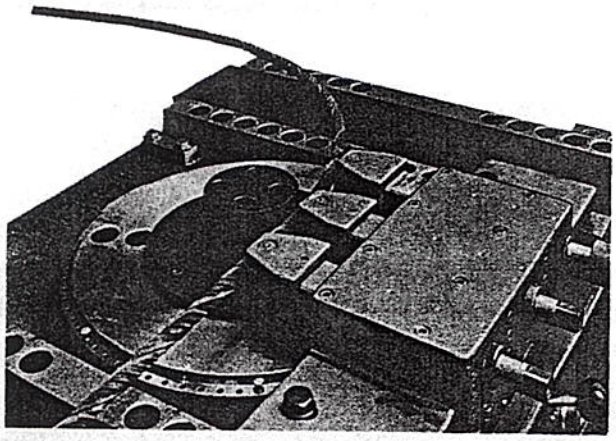

Fig. 16: Set-up for making bow members

XI. Machine Maintenance

The equipment has no lubrication points at all, so that only the holes for the various pins in the overarm retainer bars and in the turntable should be kept slightly greased to prevent rusting.

The gear box is lubricated by filling with 352 pounds of SHELL special gear box grease H. (Designation in english: Simnia Grease 012)

XII. Disassembly and Assembly of Machine

It is necessary for some reason or other desassemble the machine, proceed as follows:

1. Remove left and right-hand panels (94 and 95). Screw out the hex. bolts (76).

2. Disconnect the following terminals in the control box (270).

   For the motor:
   SL – U1 – V1 – W1 – SL – U2 – V2 – W2

   For the brake:
   1, 2

   For the thermostat:
   3, 4

   For the limit switch: (302)
   15, 16

   For the reversing switch: (303)
   6, 18, 19, 20

   Mark the disconnected terminals with the above identification letter/figure combinations.

3. After disconnecting the terminals, withdraw the wires carefully from the control box (270).

4. Using a crane of lifting block, lift the machine top complete with gearmotor out of the housing.

5. Provide clean planks to deposit removed components on. Care should be taken to ensure that the loose wires and cables hanging down are not damaged or torn off.

6. The bending machine is assembled in the reverse sequence.

XIII. Ordering Procedure for Replacement Parts

The replacement parts list includes assembly drawings of your machine in order to familiarize you with the interrelated functions of the various parts and components and to eliminate misunderstandings in the event of enquiries or ordering of replacement parts.

Each part has a designation and parts number allocated to it.

When ordering replacement parts, please furnish the following information:

Model .....
Machine Serial No. .....
Part designation .....
Parts No. .....

Example:

BO 40L – No. 6~~41/31592/23~~ – Bending Roll 7" dia. – Parts No. 142

Standard Equipment

1 Bending Pin 3/4" – 20 mm dia.	Part No. 135
1 Bending Pin 1 3/8" – 35 mm dia.	Part No. 136
5 Bending Pins 2" – 50 mm dia.	Part No. 137
1 Bending Roll 2 3/4" – 70 mm dia.	Part No. 138
1 Bending Roll 3 1/2" – 90 mm dia.	Part No. 139
1 Bending Roll 4" – 105 mm dia.	Part No. 140
1 Bending Roll 5 1/2" – 140 mm dia.	Part No. 141
1 Bending Roll 7" – 180 mm dia.	Part No. 142
1 Bending Roll 8 1/4" – 210 mm dia.	Part No. 143
1 Bending Roll 10" – 250 mm dia.	Part No. 144
1 Elliptical Bending Rolls 16 1/2 / 22" – 420/560 mm dia.	Part No. 148
1 Overarm assembly, complete	Part No. 150 – 153

Optional Equipment

1 Bending Roll 12" – 300 mm dia.	Part No. 251
1 Bending Roll 15" – 390 mm dia.	Part No. 252
1 Bending Roll 19" – 480 mm dia.	Part No. 253
1 Elliptical Bending Rolls 10 1/2/15" – 270/390 mm dia.	Part No. 256

Stress Member Bending Attachment (Optional Equipment)

1 Guide Bar with stop blocks and stops Part No. 165 – 178

Double-Bending Attachment h = 550 mm (Optional Equipment)

1 Bending Arm Assembly, complete	Part No. 190 and 191
1 Center Pin	Part No. 192
3 Spacers	Part No. 193

Coil Bending Attachment (Optional Equipment)

1 Coil Bending Attachment, complete	Part No. 205 – 227
2 Hex. Bolts M 16 x 120	Part No. 208
2 Washers 17 mm dia.	Part No. 209
1 Drive Roll with Drive Pulley	Part No. 228 – 232
4 Socket Head Cap Screws M 12 x 20	Part No. 233
1 Pitch adjusting Arm Assembly, complete	Part No. 237 – 242
1 Crank Handle 8" x 3/4"	Part No. 234
1 Forced-Feed Lubricator	Part No. 249
1 Single-Ended Spanner 36 mm	Part No. 250

XIV. Recommendations For Layout of Reinforcing Bar Operations

For efficient operation it is essential that manual work be reduced to a minimum and handling mechanized to the maximum.

Operations on reinforcing bars should therefore be carried out on a flow-line basis, i.e.

Bar stock store — cutting lines — bending lines — Store for finished products

A modern installation for operations on bar steel should consist of the following stations:

1. Bar Stock Store

This should be located at the head of an in-road or a railroad siding with a layout permitting the storage of the various grades and diameters of steel bar in separate locations. As far as possible bar stock should be placed in storage by crane.

2. Cutting Table — Cutting and Measuring Truck

The cutting table or cutting and measuring truck should be equipped with mechanical draw gear to withdraw bar stock from storage. It should have travel gear and be arranged at the head of the bar store.

2a) The Cutting Machine

should be installed on one side of the measuring truck at the top and level with the bar store.

2b) The Short Lengths Pit

serves for collecting and storing all cut-offs likely to be useful in further operations.

3. Roller Tables

with idling or powered rollers shift the bar material from the measuring truck.

4. The Bending Machine

should be installed at the end of the roller table, leaving sufficient space for the operator.

5. The Bending Table

follows the bending machine; in conjunction with this and the roller table it forms the bending line.

6. The Stress Member Bending Table

is arranged level with the measuring truck to function as roller table for the stress member bending machine.

7. The Stress Member Bending Machine

should be installed in every reinforcing bar working line.

8. A Roller Line

with powered rollers or **travelling trolleys** serve for removal of bar stock not to be processed.

9. Handling Equipment

for the transportation of processed bar material (two or four-wheel trolleys).

10. Finished Product Store

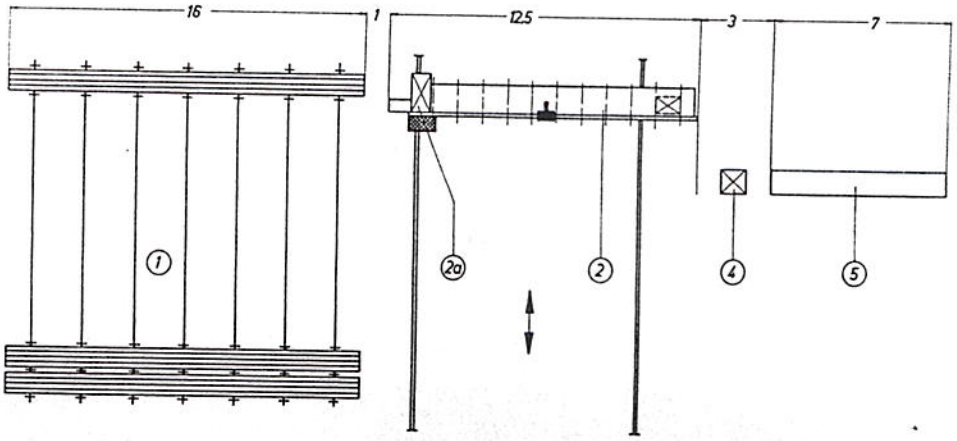

Fig. 17:

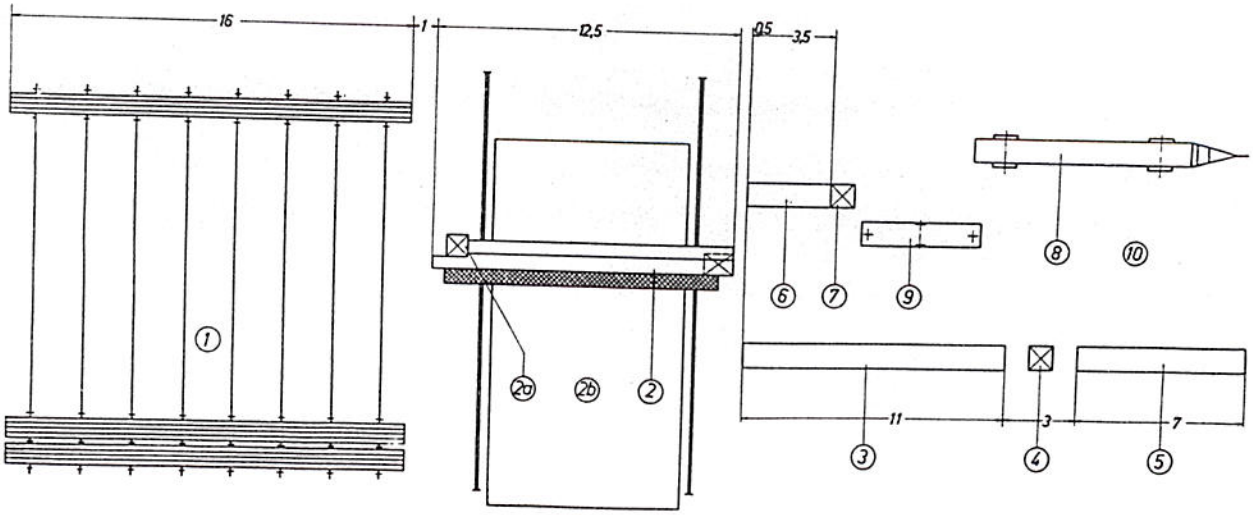

Fig. 18:

We plan complete reinforcing bar working installations and would be pleased to advise you on the rationalization and modernization of existing cutting and bending facilities. Please address your enquiries to our distributors or to us.

Muhr und Bender Attendorn

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