OPERATOR'S MANUAL AND PARTS LIST

MUBEA Hydraulically Powered Shears for Flat, Bar, and Sectional Steel with Coper-Notcher and Punch

MODEL HPSN 350

Serial Number:
Motor Type:
Motor Rating:
Operating Voltage:

OPERATOR'S MANUAL

PARTS LIST

Muhr und Bender Attendorn

D-5952 Attendorn – Telephone: (02722) 62-1 – Cables: muhr attendorn – Telex: 876706-0 mu d

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OPERATOR'S MANUAL AND PARTS LIST

MUBEA Hydraulically Powered Shears for Flat, Bar, and Sectional Steel with Coper-Notcher and Punch

MODEL HPSN 750

Serial Number:
Motor Type:
Motor Rating:
Operating Voltage:

OPERATOR'S MANUAL

PARTS LIST

Muhr und Bender Attendorn

D-5952 Attendorn – Telephone: (02722) 62-1 – Cables: muhr attendorn – Telex: 876706-0 mu d

OPERATOR'S MANUAL AND PARTS LIST

MUBEA Hydraulically Powered Shears for Flat, Bar, and Sectional Steel with Coper-Notcher and Punch

MODEL HPSN 500

Serial Number:
Motor Type:
Motor Rating:
Operating Voltage:

OPERATOR'S MANUAL

PARTS LIST

	Assembly
Machine body, complete	01574 001 00
Shear slide and shear cylinder, complete	01574 031 00
Electric foot engagement and stroke adjustment, complete	01564 045 00
Non-deform blade, complete	01564 051 00
Bar shear blade, complete	01554 052 00
Rectangular coper and guard, complete	01574 053 00
Automatic section knife, complete	01574 057 00
Punch tool, complete	01564 059 00
Hold-down, plate shear, complete	01564 063 00
Stripper punch, complete	01564 065 00
Support table for flat steel shear, complete	01518 066 00
Electrical control, complete	01574 071 00
Hydraulic power unit, complete	01503 083 00
Pipework	01574 084 00
Guard for flat steel shear, complete	01564 095 00
Guard for section shear, complete	01564 096 00
Guard for bar shear, complete	01564 097 00
Top cover	01574 099 00
Cover, drive bar, complete	01564 100 00
Operating tools	01564 102 00
Support bracket for coper-notcher saddle, complete	01564 125 00

Muhr und Bender Attendorn

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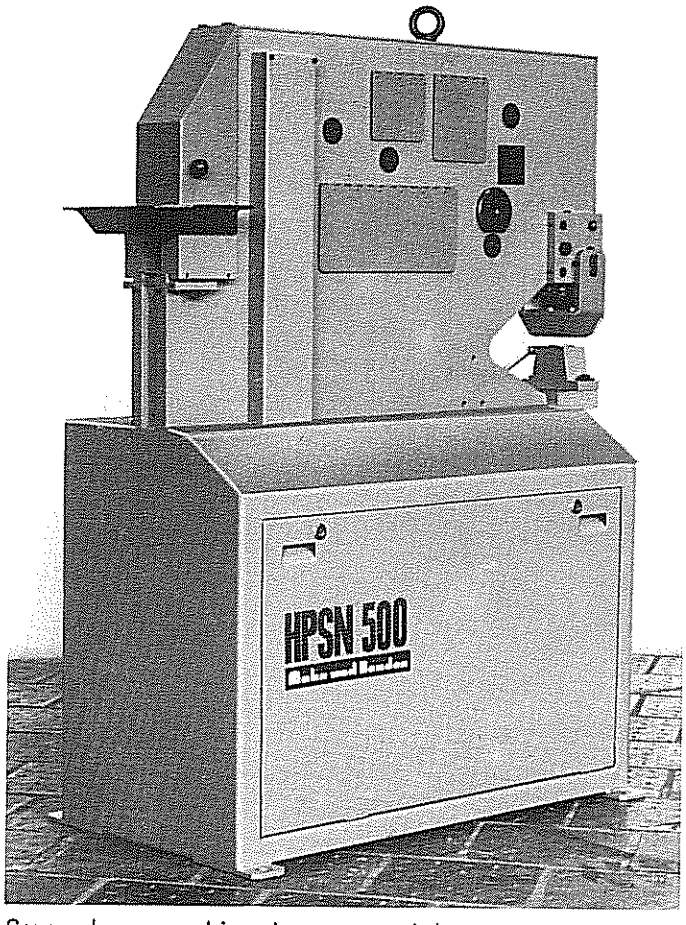
Your MUBEA machine is in accordance with the rules for prevention of accidents and the machine protection law.

To ensure safe operation, all working stations have been provided with suitable guards.

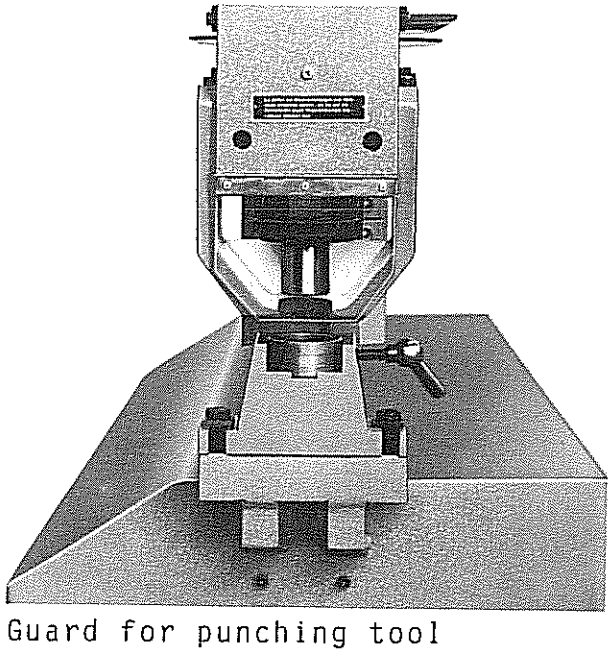
To avoid detraction from their very functions, these guards are not shown on the illustrations of the single working stations and tools.

USE ONLY THOSE PUNCHING DEVICES AND TOOLS WHICH ARE SUFFICIENTLY GUARDED AGAINST FINGER INJURY!



Guards on discharge side, for section, bar, and flat steel shear

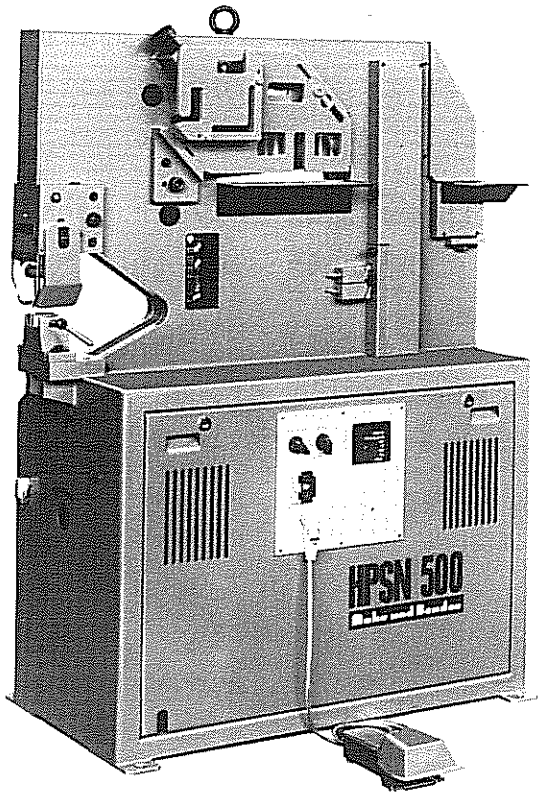
Guard for notching tools



Guard for punching tool

General

As you will soon confirm, you have made a good choice. Decades of experience and latest findings and trends in punch and shear construction have been considered in developing this MUBEA machine. As many satisfied customers have been confirming, it is just the daily handling of this machine which shows its outstanding advantages.



TO MAKE OPTIMUM USE OF THIS MACHINE, PLEASE STUDY AND THOUROUGHLY MIND THE FOLLOWING OPERATING INSTRUCTIONS.

Experience has shown that the machine is of extremely long service life. Parts being subject to normal wear can be replaced at any time. It is very important that you order original MUBEA spare parts only, for thus the required service life and steady first-class working quality will be reached. This also applies, if you intend to extend the application range of your machine by using additional tools.

Shop practice will soon convince you that just MUBEA machines can effectively be completed and are universally usable and efficient.

To give you a general idea of the single components of the machine and their interactions, please study the detailed survey of all parts and their article numbers given at the end of these instructions.

And just another important thing: Keep the machine always in the good condition it deserves. Adequate hints can be learned from the following operating instructions.

Transport

For transport by truck, stabilize, and screw the machine to solid planks.

As to the weight of your machine, please confer the leaflet enclosed.

For transport by crane, hook the machine to the provided ring bolt.

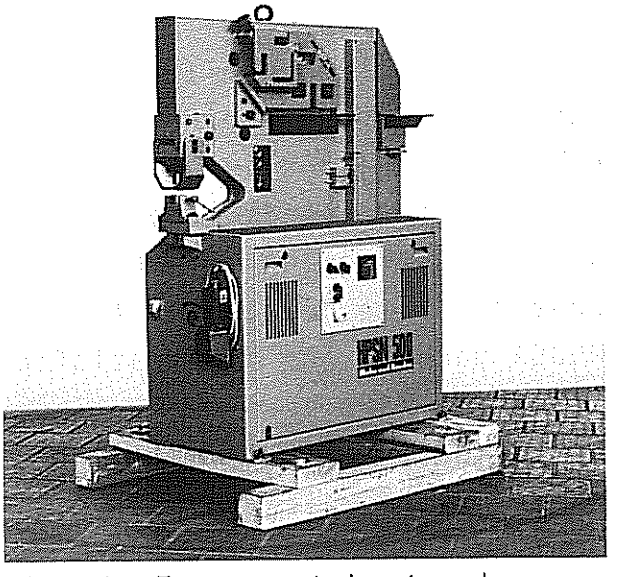


Fig. 1: Transport by truck

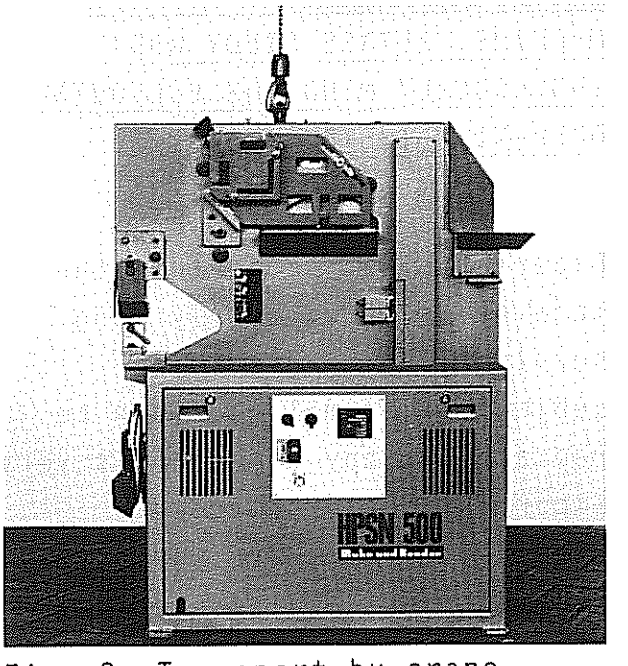


Fig. 2: Transport by crane

Installation

The working stations of the machine have normal working height. Height adjustment by means of platforms or foundations is superfluous.

All instructions required to provide a foundation at ground level for stationary installation can be learned from the foundation plan enclosed. Firmly tighten the foundation screws, as soon as the filling compound has set. Instead of foundation screws, plugs can be used as well.

Check whether the machine has been positioned vertically.

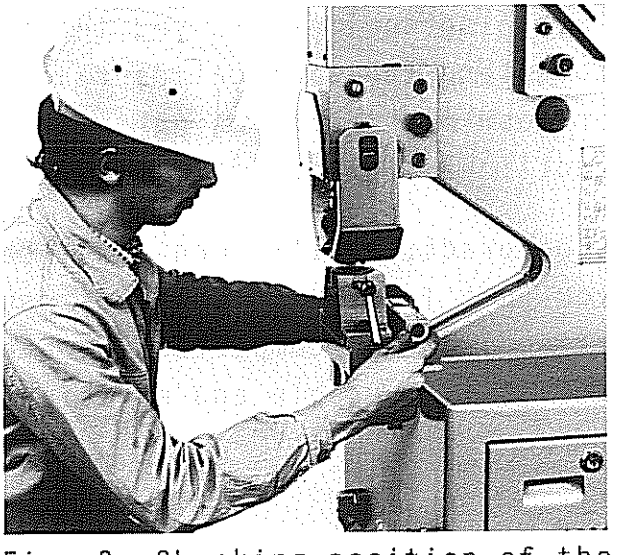


Fig. 3: Checking position of the machine

Connection and Starting

Drive and appertaining oil reservoir are located in the machine base. See that the reservoir has been filled up to approx. 3 cm below its cover. Check by way of the charging inlet.

On refilling oil, mind the maintenance instructions.

The machine has been installed ready for operation. The switch cabinet with the main switch, to which the cables must be connected, is located in the machine base. Connection must be done by an electric expert according to the wiring diagramme.
(Make sure that the voltages are identical).

Briefly start motor:
in case it will not run in arrow direction, change two phases.
For check, start motor briefly in tip mode only.

Prior to starting, check whether the working slide moves properly and the tools have precisely been adjusted. To do so, turn the selector switch to "INCHING", and move the slide stepwise to its lower dead position.
(Cf. section "Engagement").

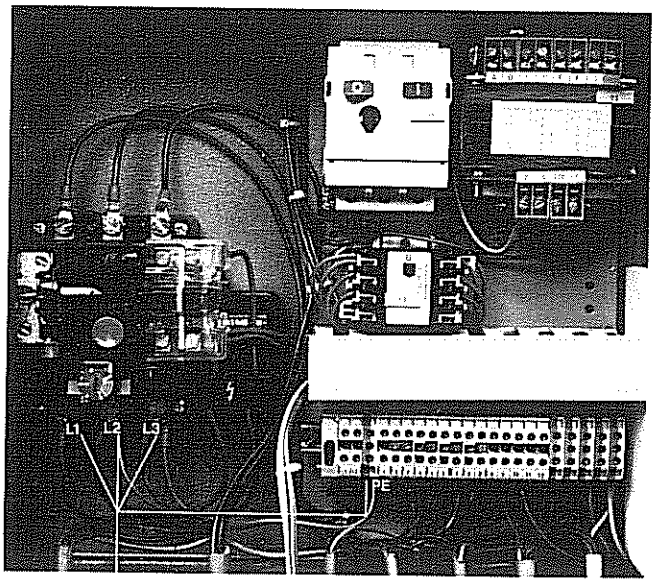


Fig. 4: Electric connection

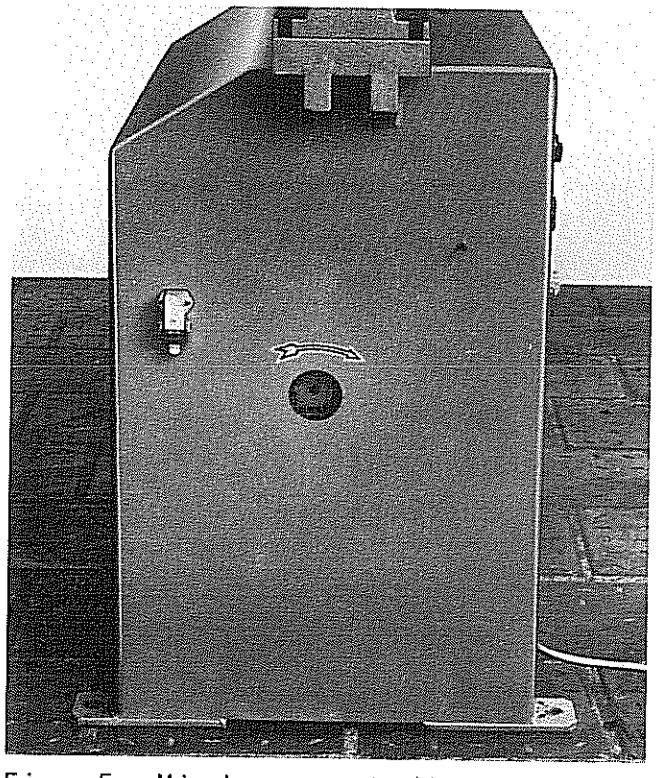


Fig. 5: Mind correct direction of motor rotation

Lubricating the machine

Lubricants

In principle, grease the machine with oil only, whereby the same type of oil can be used at all lubrication points.

Brands of oil applicable:

ARAL Deganit B 220
Viscosity 130 mm²/s at 50° C

SHELL Tonna Oil T 220
Viscosity 128 mm²/s at 50° C

MOBIL OIL AG VACTRA OIL No. 4
Viscosity 125 mm²/s at 50° C

ESSO AG MILLCOTT K 220
Viscosity 120 mm²/s at 50° C

BP ENERGOL HP - C 220
Viscosity 127 mm²/s at 50° C

Grease the machine thoroughly. (Cf. lubrication chart.)

Lubricate by means of the delivered grease gun (tool kit).

Mind the enclosed lubrication chart, and take care that the prescribed quantity of oil is injected regularly. Lubrication points are marked yellow.

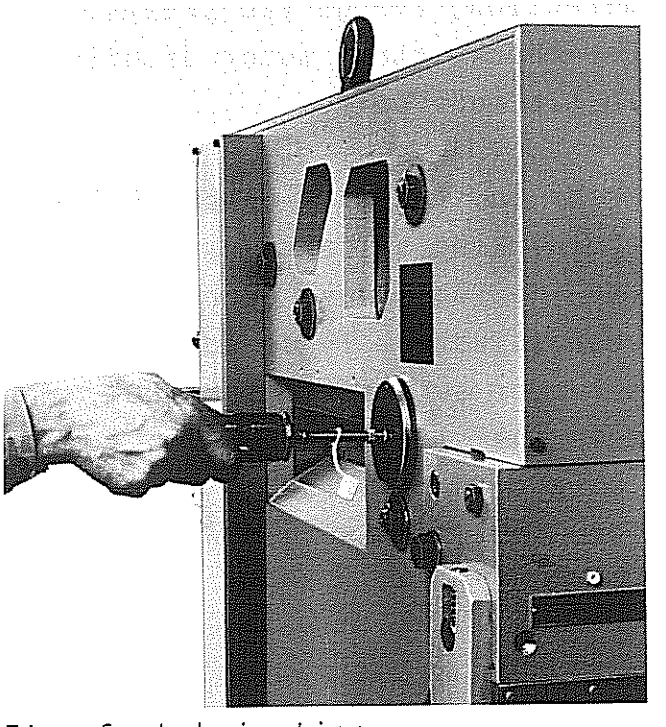


Fig. 6: Lubrication

Electric Foot Engagement

1. Preselection of Working Stations

The switch for preselection of the working stations is installed in the upper left part of the control panel of the main switch.

In case the motor has been started this switch enables preselection of the required working position of the working slide. (Shear or punch side)

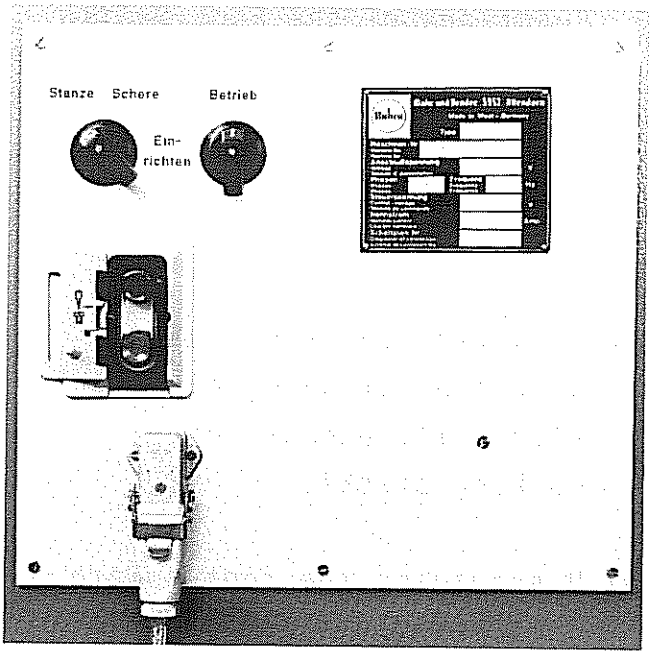


Fig. 7: Control panel

2. "SETTING" and "OPERATION" Switch

The selector switch for tool setting and engagement is installed in the upper right part of the control panel. When the switch is set to "INCHING", the working slide can stepwise be moved to its working position.

In this position, shearing and punching tools can be set, mounted, or dismounted.

When the selector switch is set to "OPERATION", the working slide automatically returns to its start position.

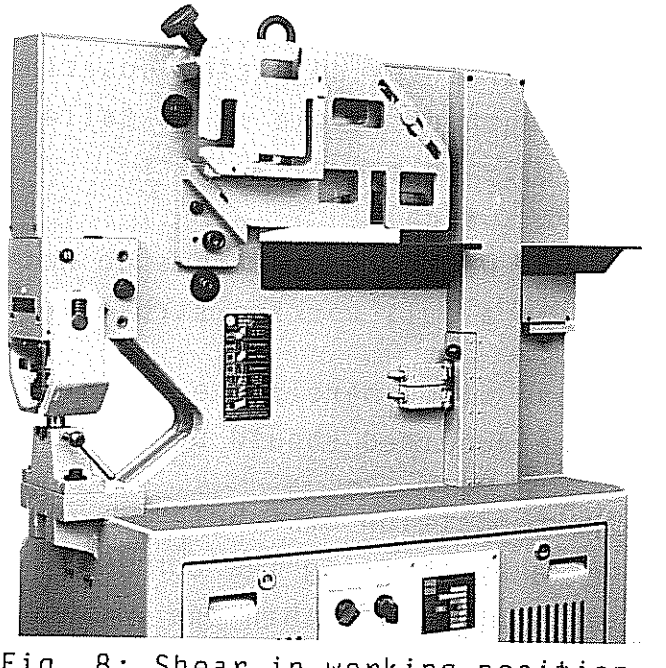


Fig. 8: Shear in working position

3. Functions of the Foot Switch

When the switch has been set to "OPERATION", three functions can be actuated by means of the foot switch:

a) Actuating the foot switch over the action point: - the slide will execute one working stroke.

b) Disengaging the foot switch just below its action point: - the slide will stop.

c) Releasing the foot switch completely: - The slide will return to its start position.

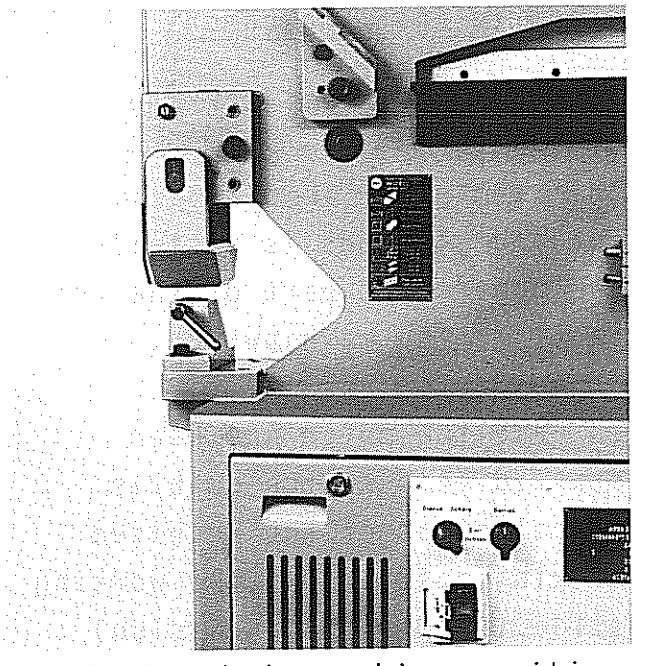


Fig. 9: Punch in working position

4. Stroke Adjustment

The control for adjusting position and length of stroke is installed laterally on the drive bars (limit switch).
Certain working operations do not require a full working stroke.

To save time, merely the working stroke required should be executed.

Adjust position or length of stroke by shifting the control cams installed within the groove of the drive bar.

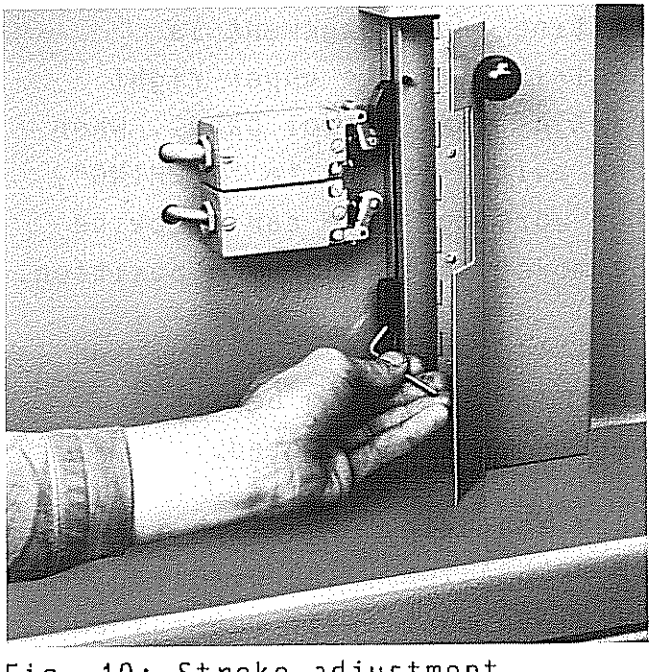


Fig. 10: Stroke adjustment

FLAT BAR SHEAR

1. Blades

The upper and lower blades are exchangeable, and can be used on four edges.

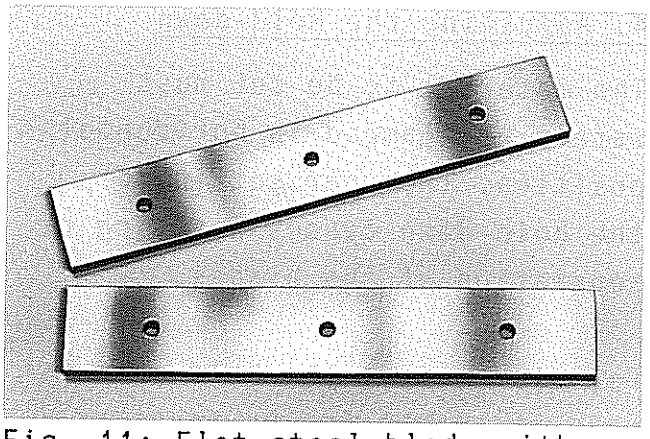


Fig. 11: Flat steel blade with four cutting edges

2. Regrinding

Regrind the blades in time (on their longer front sides only). Regrind rectangularly, and make sure that the front side is straight. On doing so, always take care that grinding is done evenly so that the setting angle will not be changed. Replace worn-out blades by new MUBEA ones.

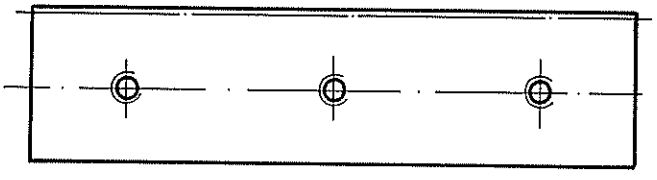


Fig. 12: Regrinding flat steel blades

3. Cutting Clearance

Set the cutting clearance of the blades to 0.2 or 0.3 mm, and check width of clearance by means of a feeler gauge, with the blade slide lowered.

The blades have properly been adjusted to cut material of any thickness within the machine's capacity range. For cutting very thin material, reduce the clearance by adding sheet foil.

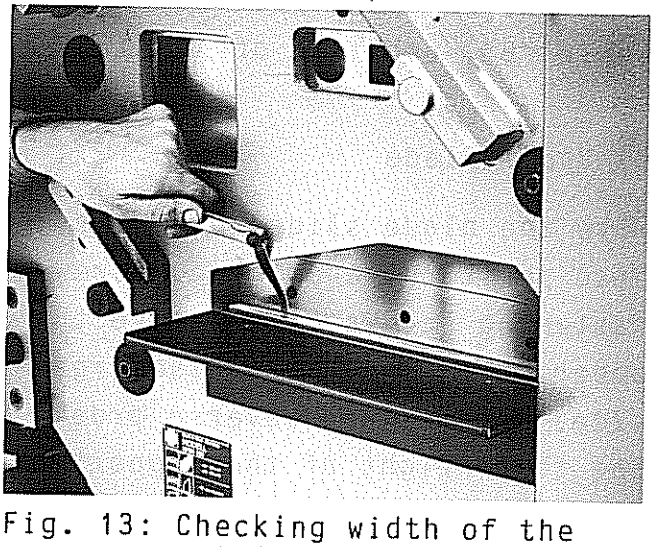


Fig. 13: Checking width of the cutting clearance

4. Adjusting the Hold-down

The material to be cut must safely be clamped in horizontal position. Improper setting of the hold-down causes notching or separation of the blades.

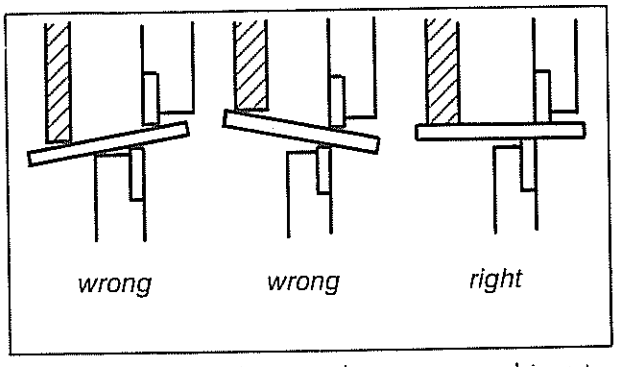


Fig. 14: Right and wrong adjustment of hold-down

For dismounting the hold-down, move it to the top by means of the adjusting wheel until the lateral openings of the plate meet the "noses" of the cover strips.
Remove the hold-down to the front.
(HPSN 350 and HPSN 500)

Concerning model HPSN 750 please fasten fastening screws A tight and swing the hold down forward to the right.

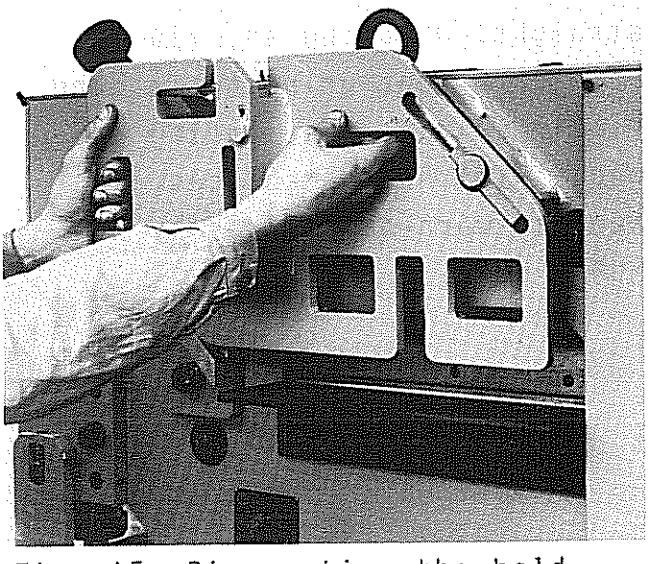


Fig. 15: Dismounting the hold-down
(HPSN 350 and HPSN 500)

5. Exchanging Blades

(Cf. fig. 17/18)

a) Lower blade

Unscrew the cylinder head screws "A" on the feed side of the machine, remove supporting table "B", and take off blade "C".

b) Upper Blade

Move the blade slide to lowest dead position, and then unscrew fastening screws "A". Remove the upper blade "B", from discharge side. Assemble in reverse order. See that height of the supporting table meets the upper edge of the lower blade.

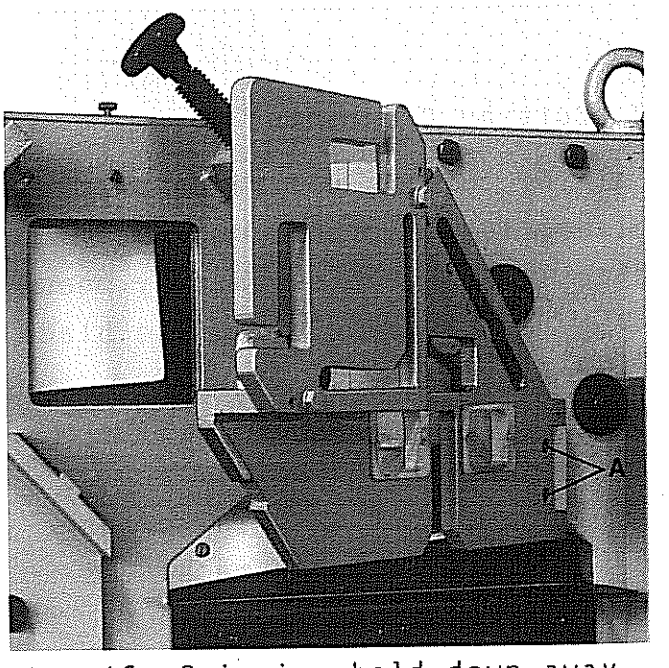


Fig. 16: Swinging hold-down away
(HPSN 750)

FLAT BAR SHEAR

1. Blades

The upper and lower blades are exchangeable, and can be used on four edges.

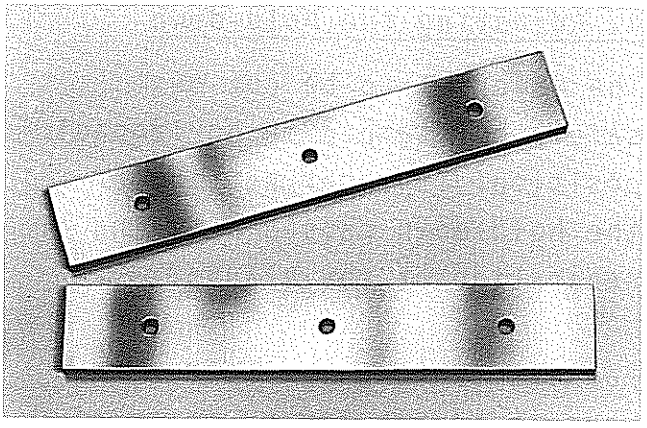


Fig. 11: Flat steel blade with four cutting edges

2. Regrinding

Regrind the blades in time (on their longer front sides only). Regrind rectangularly, and make sure that the front side is straight. On doing so, always take care that grinding is done evenly so that the setting angle will not be changed. Replace worn-out blades by new MUBEA ones.

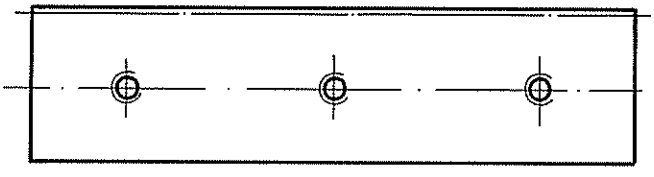


Fig. 12: Regrinding flat steel blades

3. Cutting Clearance

Set the cutting clearance of the blades to 0.2 or 0.3 mm, and check width of clearance by means of a feeler gauge, with the blade slide lowered.

The blades have properly been adjusted to cut material of any thickness within the machine's capacity range. For cutting very thin material, reduce the clearance by adding sheet foil.

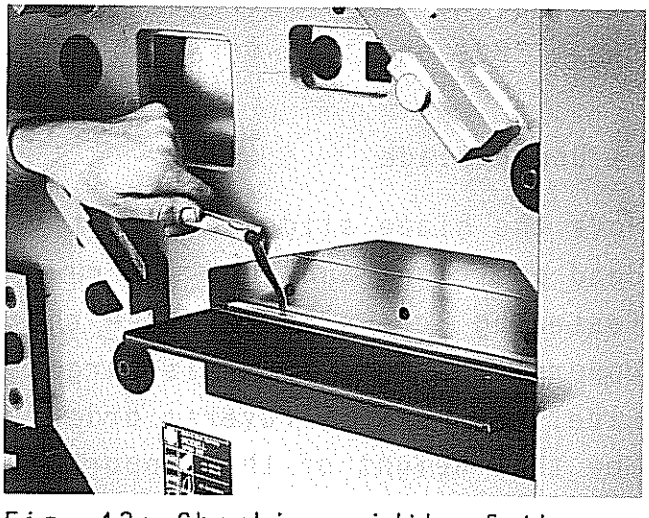


Fig. 13: Checking width of the cutting clearance

4. Adjusting the Hold-down

The material to be cut must safely be clamped in horizontal position. Improper setting of the hold-down causes notching or separation of the blades.

For dismounting the hold-down, move it to the top by means of the adjusting wheel until the lateral openings of the plate meet the "noses" of the cover strips.
Remove the hold-down to the front.

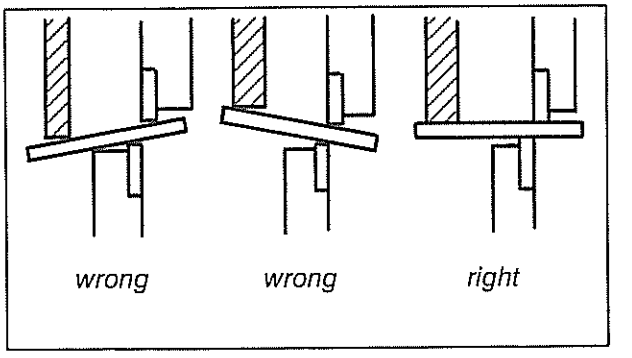


Fig. 14: Right and wrong adjustment of hold-down

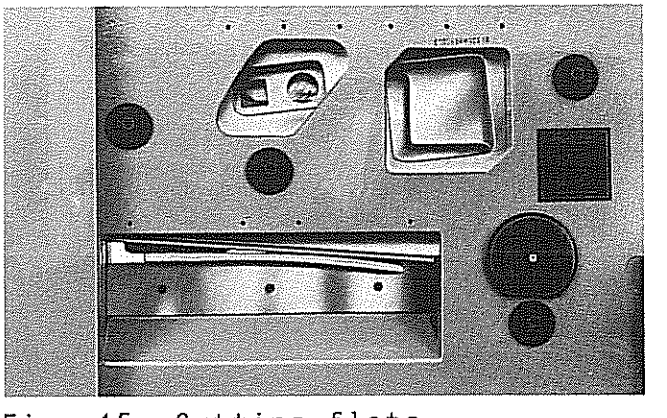


Fig. 15: Cutting flats

5. Exchanging Blades

(Cf. fig. 17/18)

a) Lower blade

Unscrew the cylinder head screws "A" on the feed side of the machine, remove supporting table "B", and take off blade "C".

b) Upper Blade

Move the blade slide to lowest dead position, and then unscrew fastening screws "A". Remove the upper blade "B", from discharge side. Assemble in reverse order. See that height of the supporting table meets the upper edge of the lower blade.

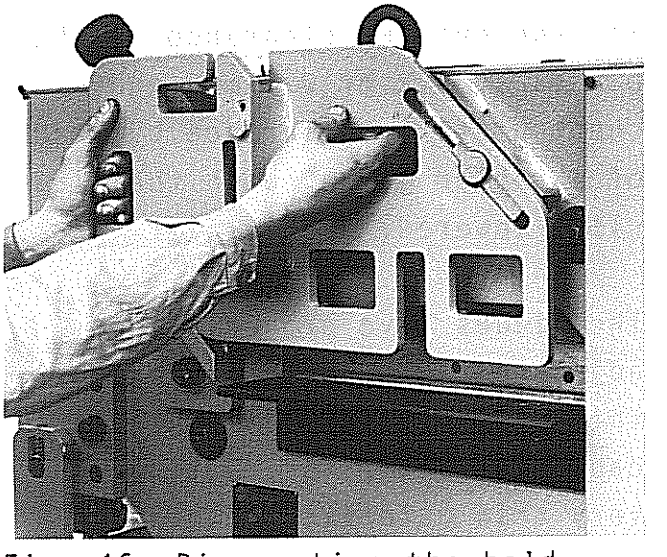


Fig. 16: Dismounting the hold-down

6. Re-adjusting the Slide Guide

In case the cutting clearance of the flat steel blade, the section steel blade, and the blade for bars has become wider after long use, re-adjust the slide guide.

Remove the locking nuts "A" on the machine's feed side, and lift the setting screws "B" by approximately one rotation (Cf. fig. 20).

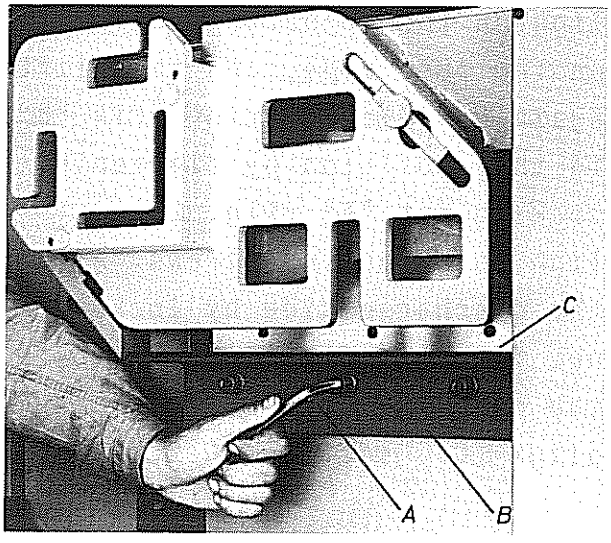


Fig. 17: Exchanging the lower blade

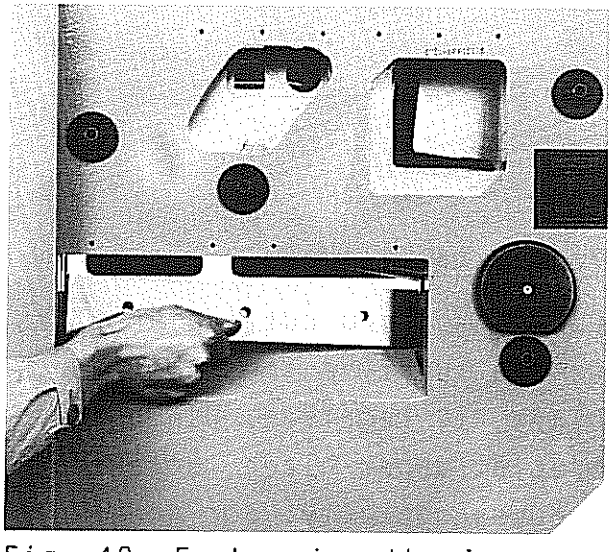


Fig. 18: Exchanging the lower blade

Remove the locking nuts "A" on the discharge side, and re-adjust the setting screws "B" with feeling (Cf. fig. 21).

Lower the blade slide, and make sure of a uniform cutting clearance on all thre cutting positions. Check by means of a feeler gauge.

To do so, the notching saddle must have previously be removed.

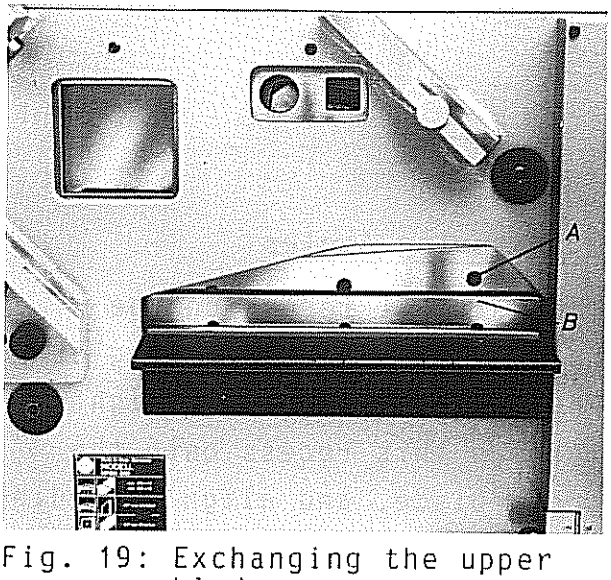


Fig. 19: Exchanging the upper blade

Tighten the adjusting screws "B" on the feed side, and then lift again by 1/16 rotation. Fix "B" in this position by tightening locking nut "A" (Fig. 20). Tighten adjusting screws "A" on the discharge side by locking nut "B" (Cf. fig.21), assemble the notching saddle again, and align (Cf. section "Notcher").

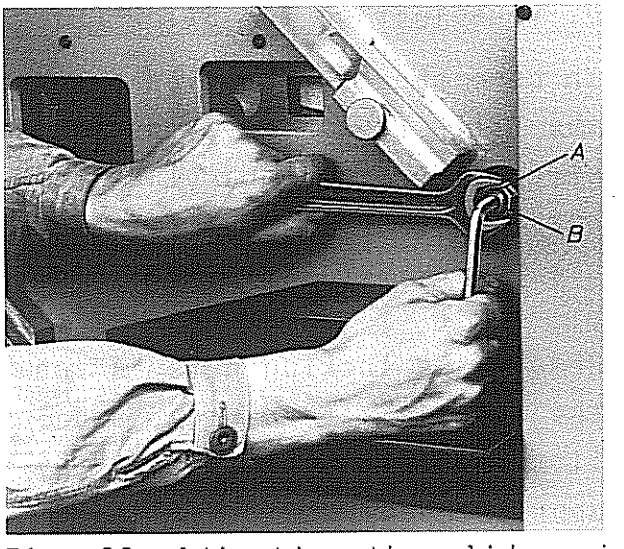


Fig. 20: Adjusting the slide guide - - feed side -

7. Special Blades

For non-deform cutting of flats, we can supply a special upper blade, if required. Use of this special upper blade, however, reduces capacity. For non-deform cutting flats, merely interchange the upper blades.

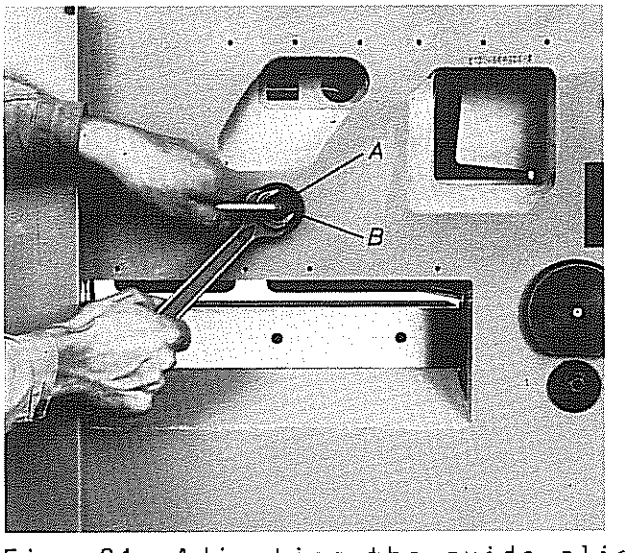


Fig. 21: Adjusting the guide slide - discharge side -

8. Mitering Angles

The vertical recess on the hold-down enables mitering of angles. Push the angle right through this recess onto the upper blade, and align according to the marks on the supporting table.

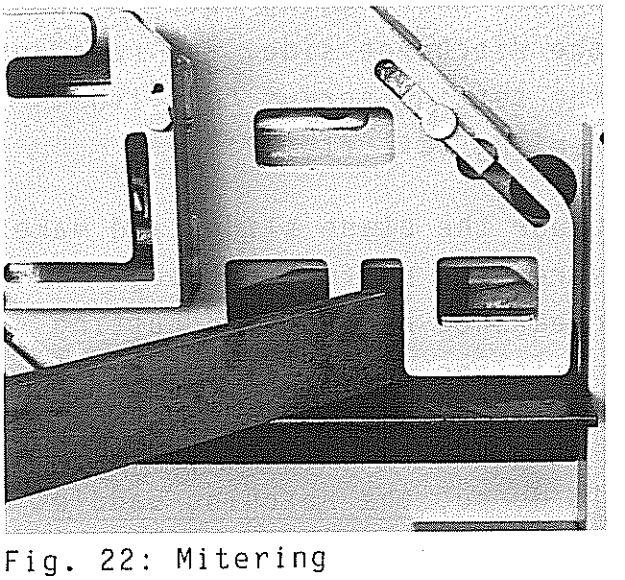


Fig. 22: Mitering

COPER / NOTCHER

1. Rectangular Coper:

Especially suitable for coping flanges and webs.

Wider copings possible by adequate successive feed.

2. Adjusting Coping Tools

As the coping saddle is universally adjustable, the tool's underpart can easily be adjusted to the upper blade. Mind the uniformity and evenness of the cutting clearance. The latter has already been adjusted for maximum performance. For cutting very thin material, reduce width of clearance by adding sheet foil.To do so, lower the blade slide until the upper coping blade just inserts into the underpart of the tool, and check width of clearance by means of a feeler gauge.

To adjust the tool loosen the saddle screws "A", and properly adjust the saddle by means of the setting screws "B". Tighten saddle screws "A" and pressure screws "C" (Cf.fig.26).

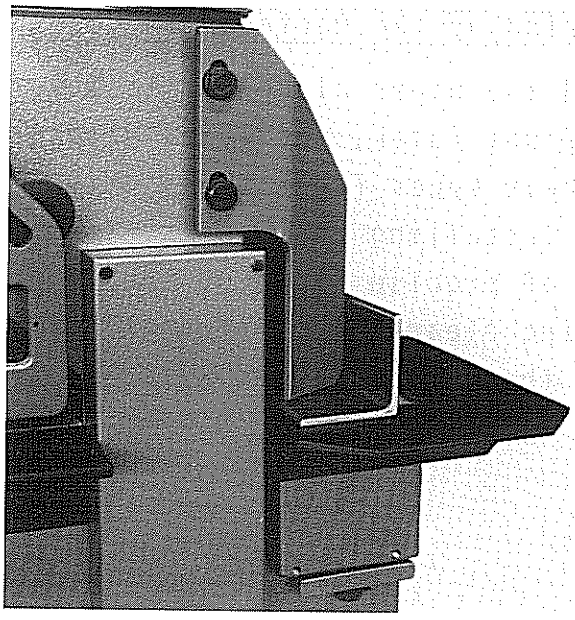


Fig. 23: Coping angles

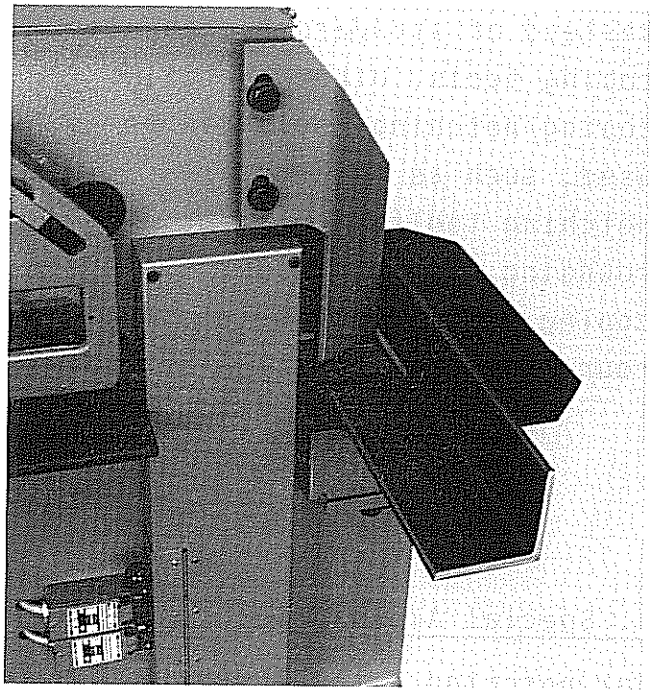


Fig. 24: Wide rectangular coping

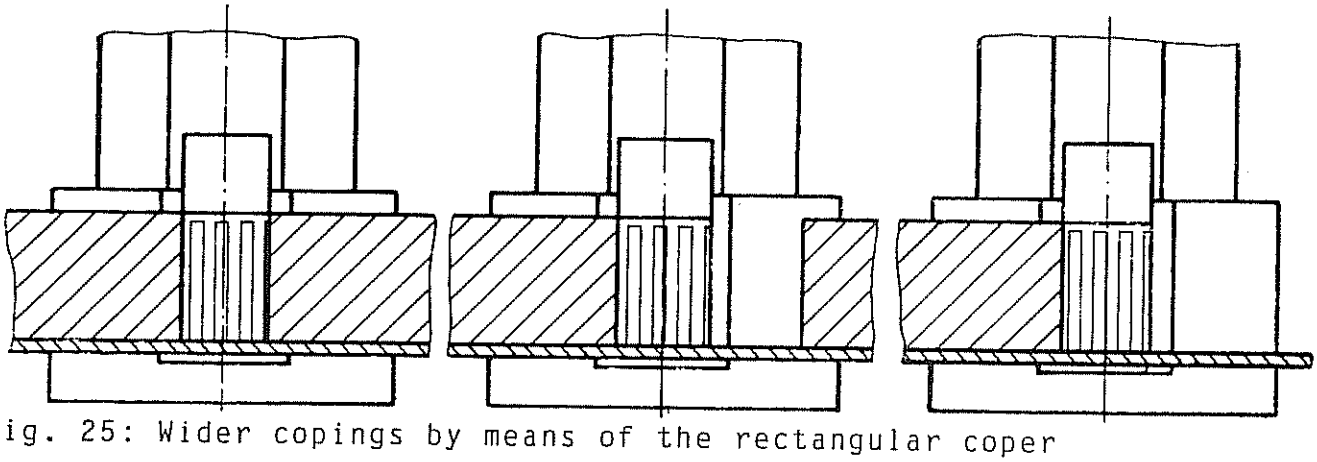


Fig. 25: Wider copings by means of the rectangular coper

3. Grinding the Rectangular Coper

Grind the upper blade on its lower and front faces, the lower blades on their upper front faces only. When installing the blades, take care of precise width of the cutting clearance. (Frequently daub the cutting edges with oil).

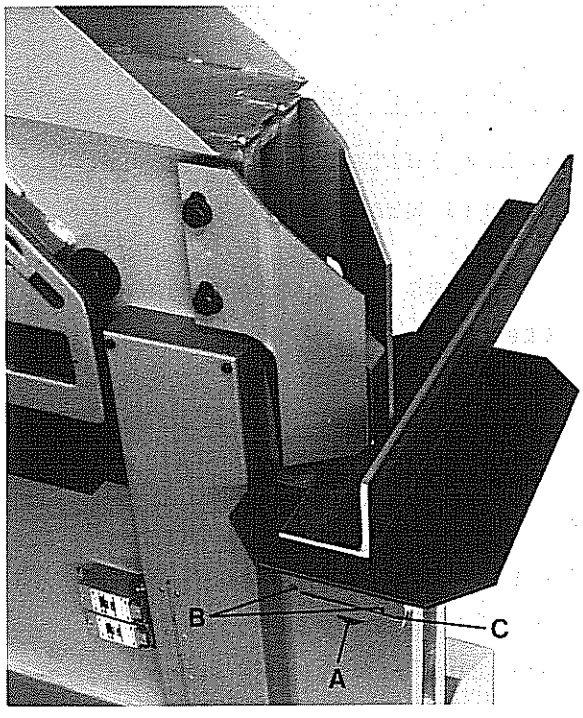


Fig. 26: Deeper coping of angles by appropriate feed

4. Special Tools

Instead of standard rectangular coping tools, other special coping/notching tools can be used, such as triangular notching tools, tools for rounding fish plates or tools for coping flats to be welded to round bars or tubes.

5. Special Accessories

For notching without previous scribing, we additionally can supply special supporting tables. Please let us know your inquiries. So we can prepare and offer the best possible solution.

Please note

The coper/notcher has been provided with a safety hood. We strongly advise you to keep this safety device always ready for use.

Warning:

The coper/notcher is fitted with a guard and with 2 hold-downs (1 on each side).

We urgently recommend not to remove these parts in order to prevent accidents. In addition, removal of the hold-downs causes increased wear (chipping) of the blades.

COPER / NOTCHER

1. Rectangular Coper:

Especially suitable for coping flanges and webs.

Wider copings possible by adequate successive feed.

2. Adjusting Coping Tools

As the coping saddle is universally adjustable, the tool's underpart can easily be adjusted to the upper blade. Mind the uniformity and evenness of the cutting clearance. The latter has already been adjusted for maximum performance. For cutting very thin material, reduce width of clearance by adding sheet foil.To do so, lower the blade slide until the upper coping blade just inserts into the underpart of the tool, and check width of clearance by means of a feeler gauge.

To adjust the tool loosen the saddle screws "A", and properly adjust the saddle by means of the setting screws "B". Tighten saddle screws "A" and pressure screws "C" (Cf.fig.23).

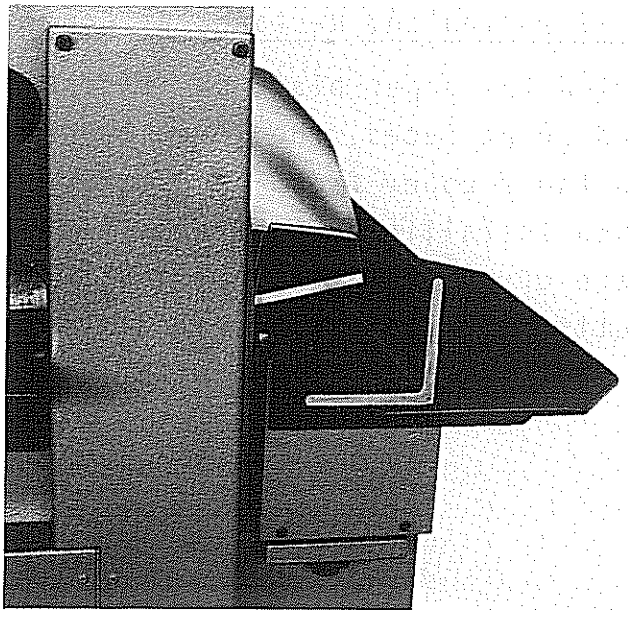


Fig. 23: Coping angles

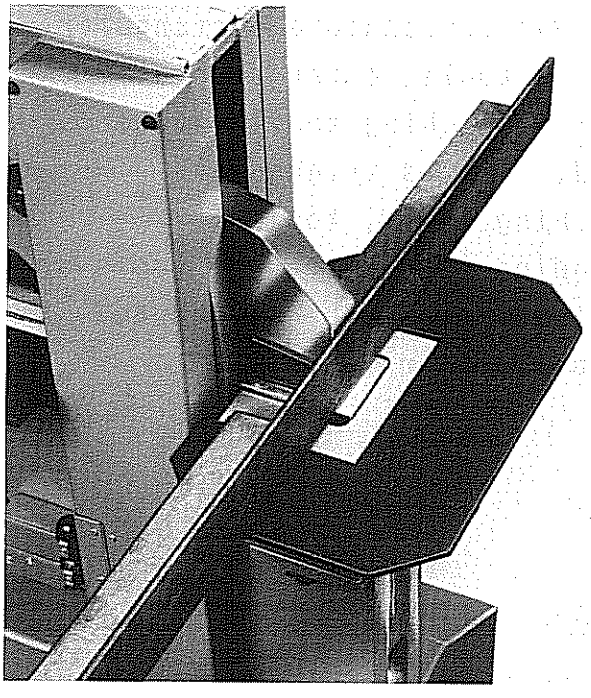


Fig. 24: Wide rectangular coping

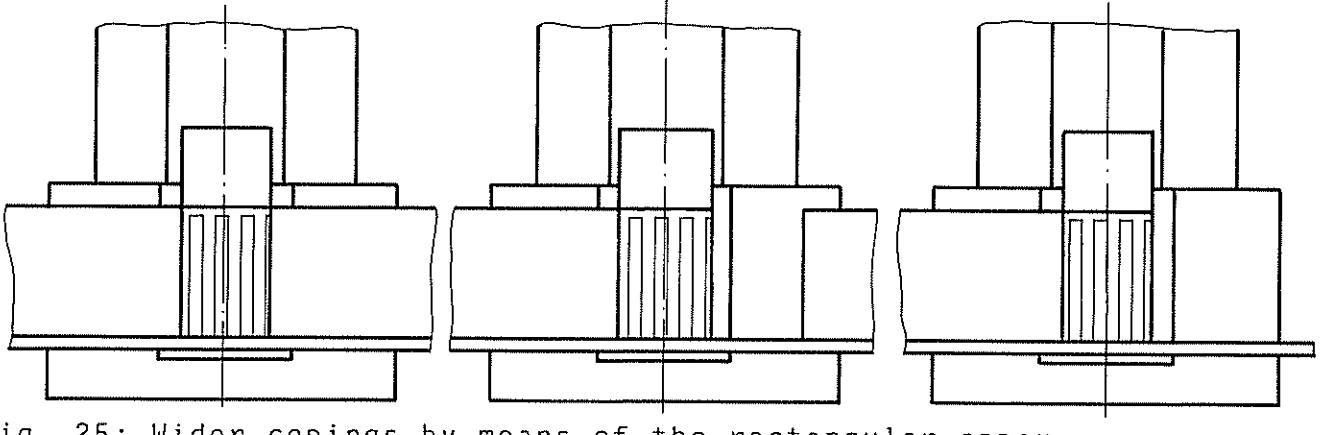


Fig. 25: Wider copings by means of the rectangular coper

3. Grinding the Rectangular Coper

Grind the upper blade on its lower and front faces, the lower blades on their upper front faces only. When installing the blades, take care of precise width of the cutting clearance. (Frequently daub the cutting edges with oil).

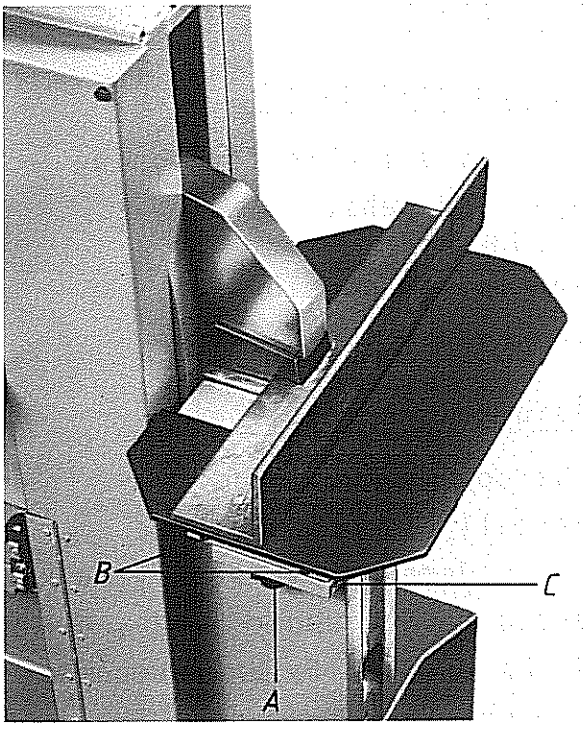


Fig. 26: Deeper coping of angles by appropriate feed

4. Special Tools

Instead of standard rectangular coping tools, other special coping/notching tools can be used, such as triangular notching tools, tools for rounding fish plates or tools for coping flats to be welded to round bars or tubes.

5. Special Accessories

For notching without previous scribing, we additionally can supply special supporting tables. Please let us know your inquiries. So we can prepare and offer the best possible solution.

Please note

The coper/notcher has been provided with a safety hood. We strongly advise you to keep this safety device always ready for use.

BAR SHEAR

1. Blades

As standard, the machine is equipped with blades for cutting round and square bars.

2. Regrinding

Regrind within the cutting openings only. As dull blades will cause greater expenditure of force and effect unsatisfactory cutting results, ask for new MUBEA blades in time.

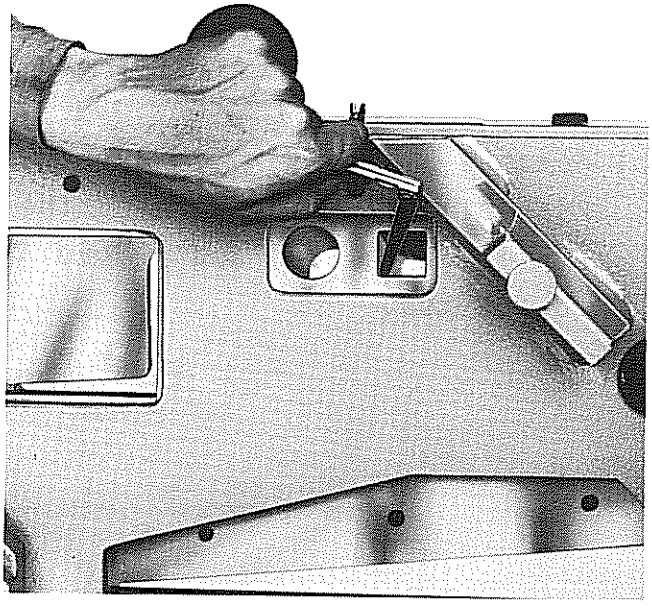


Fig. 27: Checking width of the cutting clearance

3. Cutting Clearance

Width of the cutting clearance must be 0.2 to 0.3 mm. On delivery, the blades have properly been adjusted in the factory.

For reducing width of the cutting clearance, back the blades by sheet foil.

Check width by means of a feeler gauge.

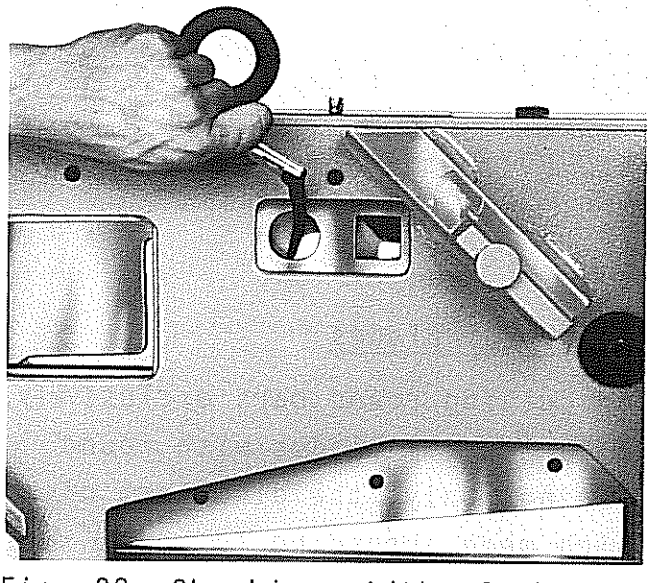


Fig. 28: Checking width of the cutting clearance

4. Hold-down

Always pay attention to that the hold-down clamps the material in horizontal position during the cutting process.

5. Exchanging Blades

a) Stationary blade:
Loosen the locking screws, lift the blade, and remove.

b) Movable blade:
Push blade into opening of the stationary blade, and remove to the top.

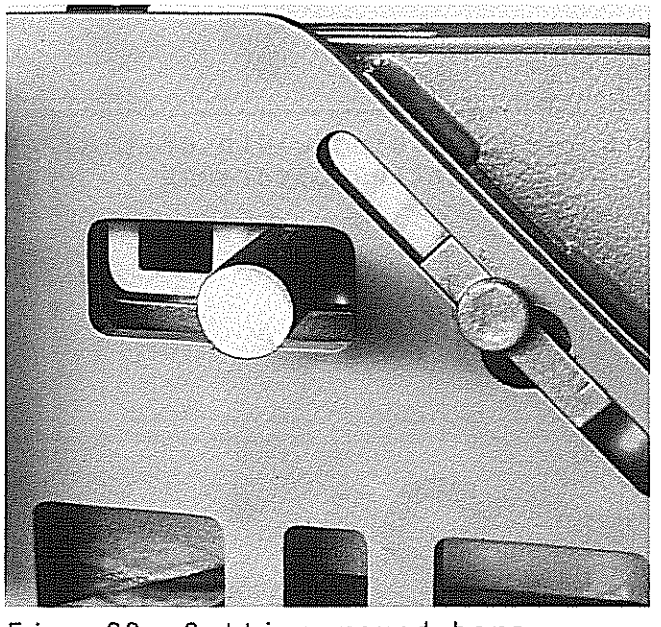


Fig. 29: Cutting round bars

6. Special Blades

For cutting round bars exclusively, we can supply blades with round openings only, the diameters of which made according to your requirements.

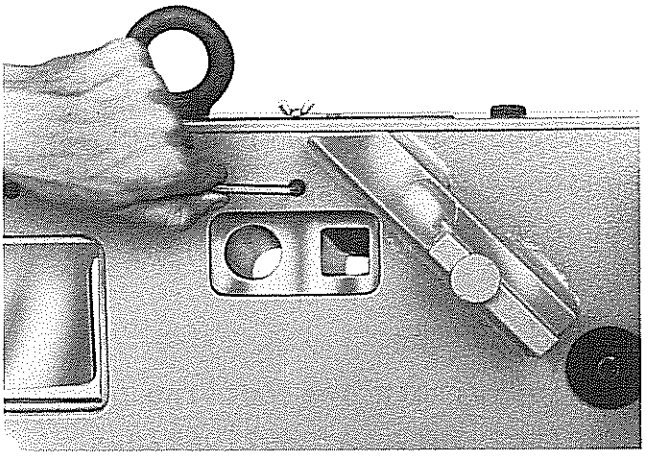


Fig. 30: Dismounting the stationary blade

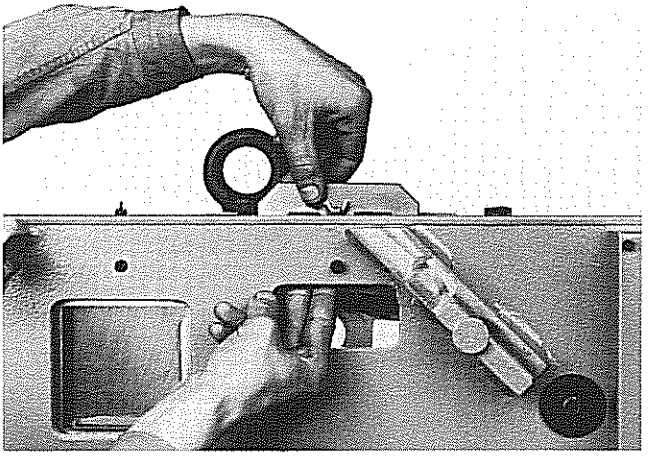


Fig. 31: Dismounting blades

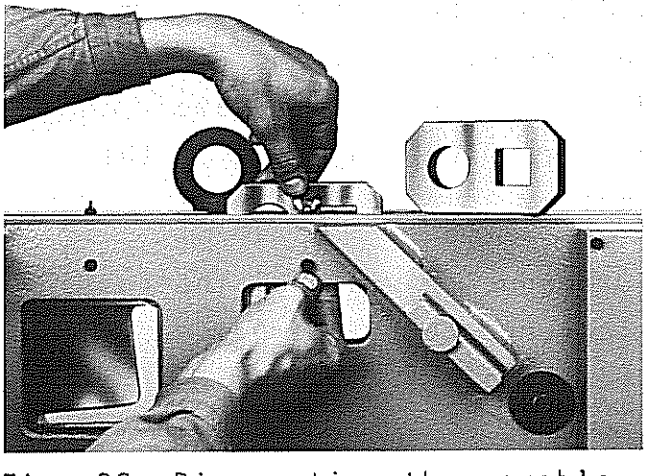


Fig. 32: Dismounting the movable blade

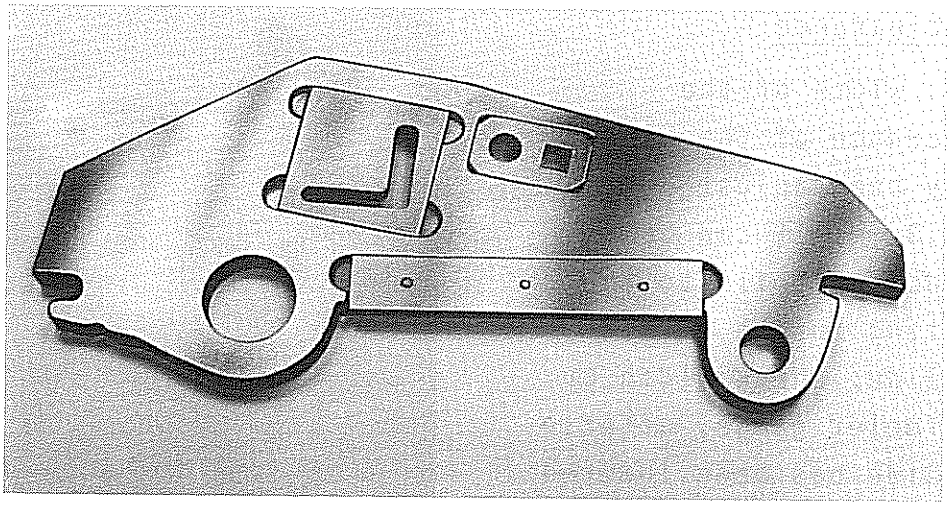


Fig. 33: Working slide

SECTION SHEAR FOR ANGLES

1. General

The machine is equipped for cutting angles 90^{o}.

2. Regrinding Blades

Regrind the blades on their cutting front faces only. Regrinding must be done uniformly so that the movable cutting insert exactly meets the tip of the stationary insert blade.

Of course, regrind only as far as permitted by the stroke of the blade slide. Worn-out blades cause bad cuts, and unnecessarily stress the machine. Therefore, ask for new MUBEA blades in time.

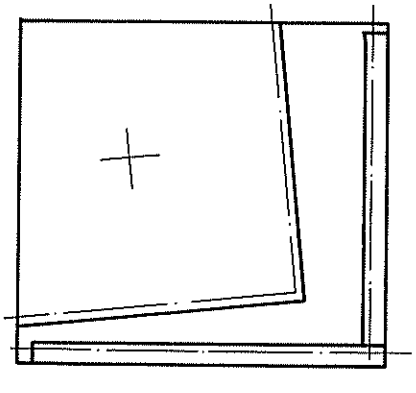


Fig. 34: Regrinding blades uniformly

3. Cutting Clearance

On delivery, width of the cutting clearance of the blades has properly been adjusted to 0.2 up to 0.3 mm. It can be reduced by adding foils to the movable cutting insert within the blade slide. Check width by means of a feeler gauge, after the blade slide has been lowered (Fig. 35).

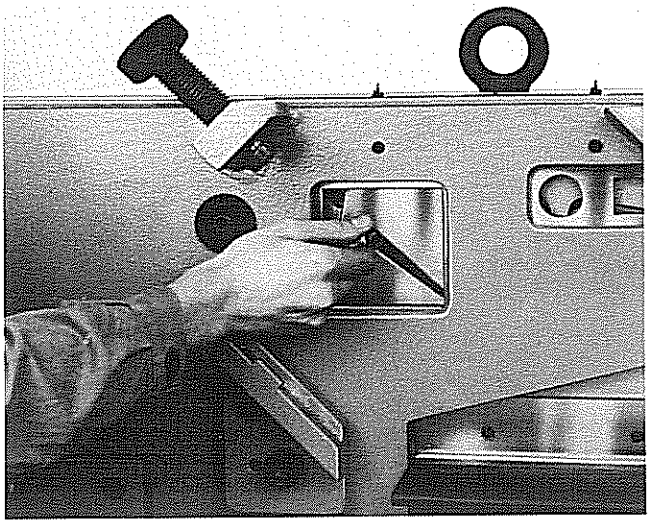


Fig. 35: Checking width of the cutting clearance

4. Hold-down

Adjust the hold-down such as to get the angularity required. Pay attention to that the root of the angle lies close to the tip of the hold-down.

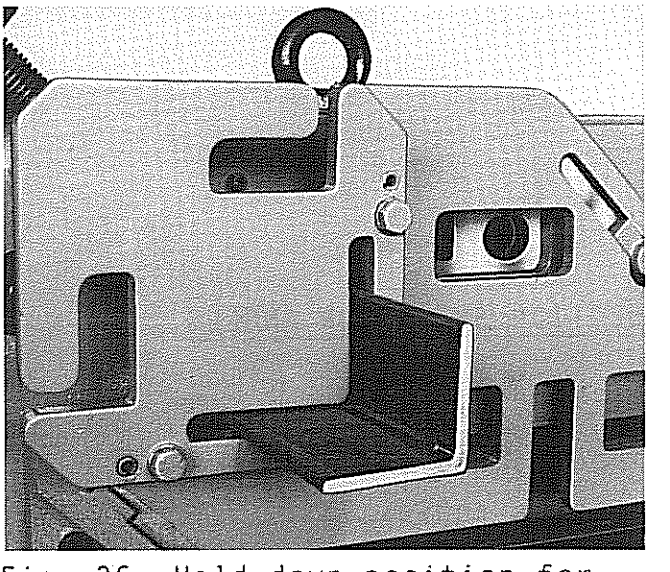


Fig. 36: Hold-down position for cutting angles

5. Dismounting Blades

a) stationary blade:
Loosen locking screw, lift blade, and remove.

b) Movable blade:
Push blade into opening of the stationary blade, and remove to the top.

Assemble blades in reverse order.

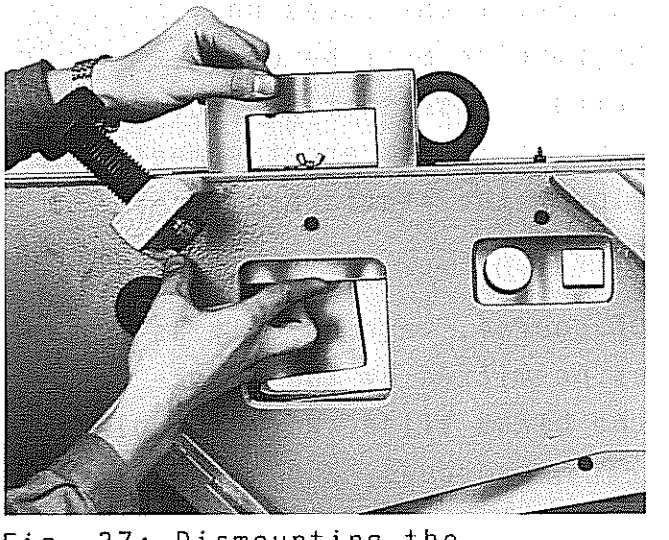


Fig. 37: Dismounting the stationary blade

6. Special Blades

In case you exclusively cut round bars, we can supply blades with round openings only, the diameters of which fixed according to your requirements.

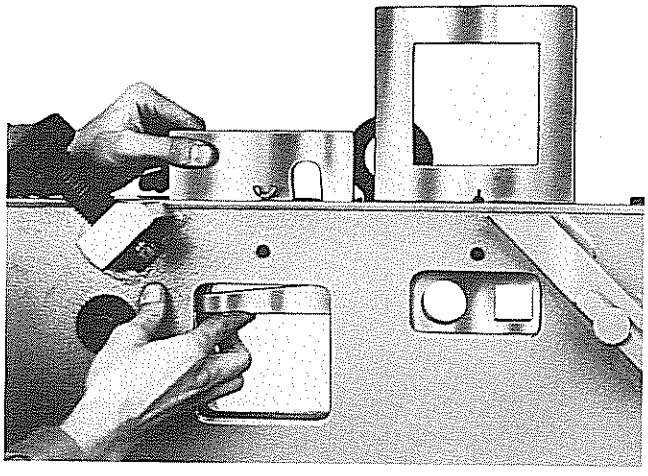


Fig. 38: Dismounting the movable blade

7. Mitering

The section shear for angles enables mitering of angles. To do so, feed the angles to be processed right through the openings provided within the hold-down onto the section shear. To ensure a clear 45^{o} cut, set the hold-down to the mark for mitre cut.

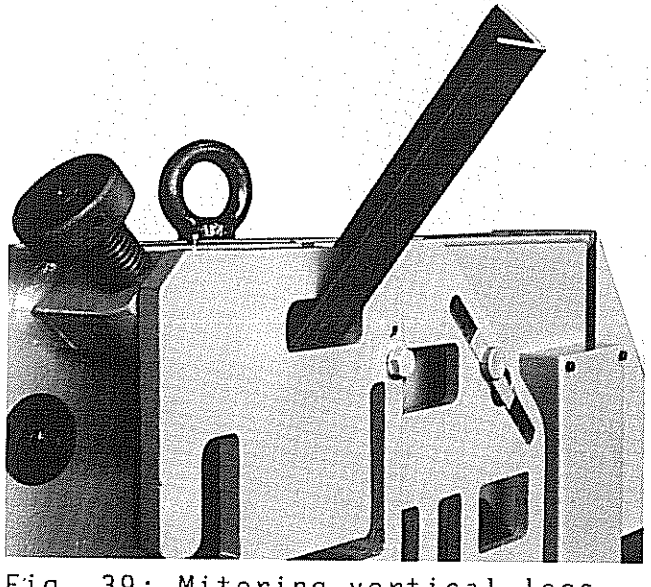


Fig. 39: Mitering vertical legs

8. Installing Blades on HPSN 500 Model

This type of machine is of so high angle cutting capacity that the whole cutting range cannot be covered by one blade position only. Therefore, there are two working positions of the stationary blade: one for angles from 0 to 8 mm, the other from 8 to 13 mm thickness. The blade has been marked, and should always be installed accordingly.

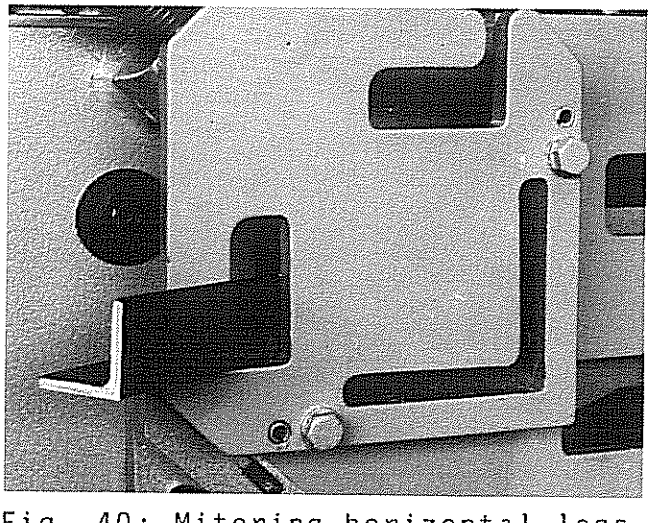


Fig. 40: Mitering horizontal legs

PUNCH

USE ONLY PUNCHING DEVICES AND TOOLS WHICH ARE UP TO THE CUTTING AREA SUFFICIENTLY GUARDED AGAINST FINGER INJURY.

IN CASE OF USING UNPROTECTED TOOLS FOR INSERT OPERATIONS, MIND THE SAFETY RULES REGARDING BENDING OPERATIONS ON POWERED PRESS BRAKES; PUBLISHED IN ZH 1/387, 4th Edition, 1981.

1. General

As the punch is hydraulically powered and stands out for its large stroke, the application range of this punch is nearly unlimited.

As standard, the machine is equipped with a punching tool for holes up to 30 mm diameter. Of course, larger special tools are applicable and part of our MUBEA Standard Programme.

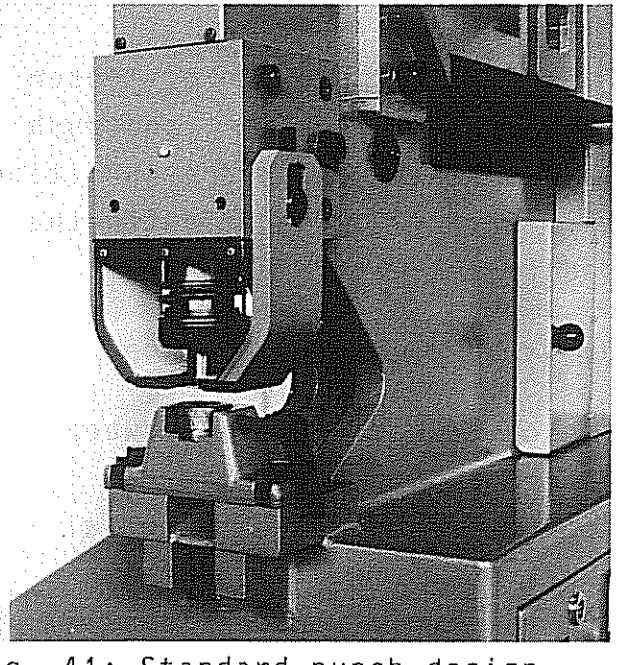


Fig. 41: Standard punch design

2. Punch Fixture

The working slide on the punch side is provided with exchangeable punch holders. By using a quick-change chuck, punches of up to 30 mm diameter can be clamped.

3. Punch Saddle

Due to the wide base of the punch saddle, the tool stands firm. Dies of up to 30 mm diameter can be used on the machine in standard version.

To remove the saddle, simply loosen the two fastening screws "A" (Cf. fig. 42), and take the saddle from the machine.

Owing to the width of the saddle plate, nearly all special accessories are applicable.

4. Setting and Centering Tools

On delivery, punch and die have precisely been centered. However, often check alignment of the tools during punching operations. Do so by inching the punch in tip mode to and into the die.

To adjust punch and die, loosen the saddle screws "A", and push saddle "B" to the proper position (Cf. fig. 42). Then tighten the saddle screws again.

Do so on every tool change.

The cutting clearance between punch and die should be approximately 5 % of material thickness (i.e. for punching 10 mm material the diameter of the die bore should be 1 mm

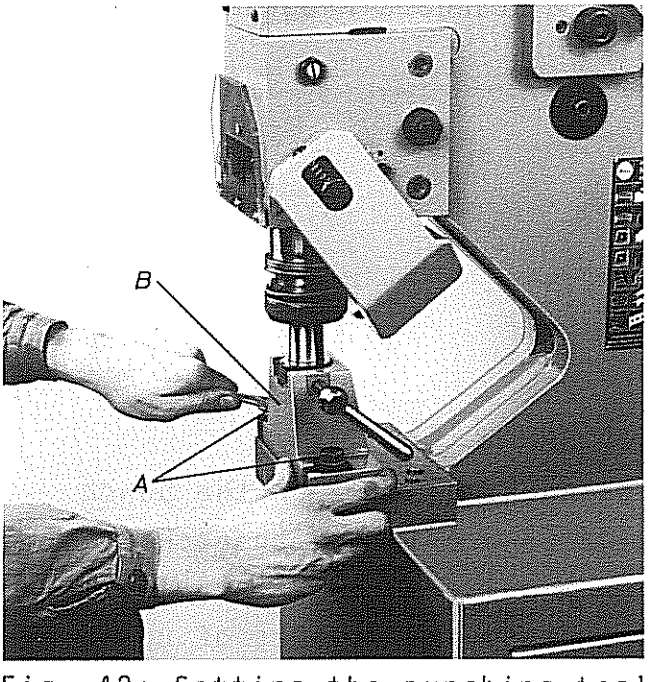


Fig. 42: Setting the punching tool

larger than the diameter of the corresponding punch. The cutting gap will be 0.5 mm).
Therefore, when ordering state thickness of the material to be processed.

5. Safety Device to Avoid Twisting of Shaped Punches

Square, oblong, or punches of other shape must be protected from being twisted. For this purpose, there is a groove on the punch holder on the surface fitting the punch, and on the front side of every shaped punch accordingly. Insert a pin of 4.7 mm diameter into this groove.

6. Stripper

The solid stripper is directly fastened to the machine body. Level differences of die and stripper can be adjusted by means of the two setting screws.

7. MUBEA Standard Punches and Dies

MUBEA punches and dies are available in 4 standardized sizes:

Size I up to 15 mm dia.
Size II over 15 mm up to 30 mm dia.
Size III over 30 mm up to 40 mm dia.
Size IV over 40 mm up to 50 mm dia.

For punching flanges of channels or I-beams, we supply flange punching dies with inclined surface matching the inclination of the steel section to be processed.

To punch small angles, tees, channels or I-beams according to gauge line near the web, flange or leg, eccentric dies are required, having the bore near their edges. When mounting the eccentric dies, push the punch saddle back until punch and bore of die lie on one axis. Please ask for our detailed catalogue on MUBEA Standard Punches and Dies.

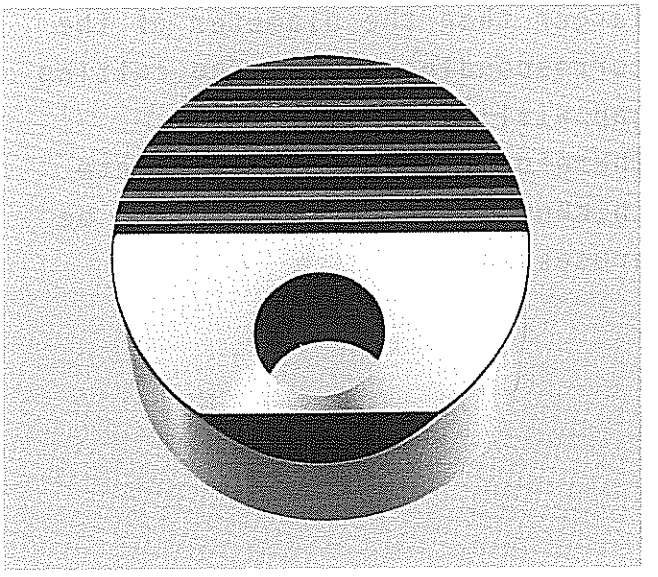


Fig. 43: Flange die for I-beams

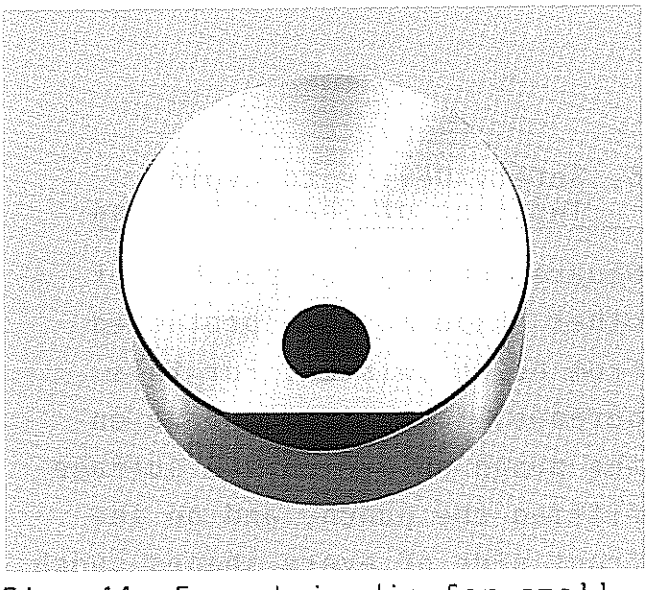
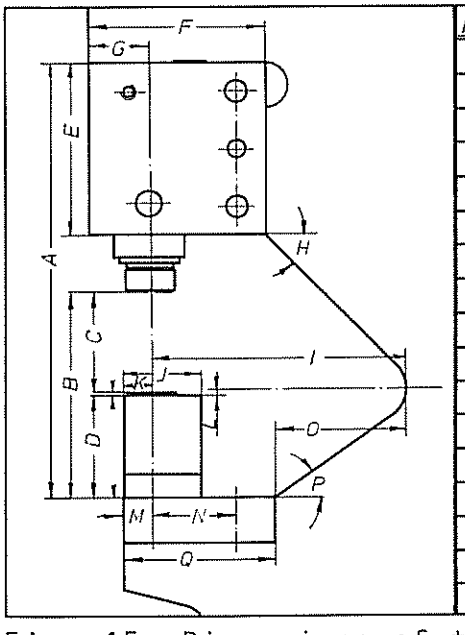


Fig. 44: Eccentric die for small angles



HPSN	350	500	750	HPSN	350	500	750
A	380	380	477	A	14 15/16	14 15/16	18 1/32
B	197.5	200	237,5	B	7 5/16	7 1/2	8 7/8
C	102,5	105	142	C	3 5/8	3 3/4	5 1/8
D	92,5	92,5	92,5	D	3 5/8	3 5/8	3 5/8
E	150	150	200	E	5 7/8	5 7/8	7 7/8
F	150	150	170	F	5 7/8	5 7/8	6 3/4
G	50	50	60	G	1 15/16	1 15/16	2 3/8
H	45°	35°	25°	H	45°	35°	25°
I	220	270	500	I	8 5/8	10 5/8	20
J	65	65	65	J	2 1/2	2 1/2	2 1/2
K	23	23	30	K	7/8	7/8	1 1/8
L	2,5	2,5	2,5	L	3/32	3/32	3/32
M	25	25	30	M	1	1	1 1/8
N	80	80	80	N	2 3/4	2 3/4	2 3/4
O	115	165	400	O	4 1/2	6 1/2	14 7/8
P	35°	25°	10°	P	35°	25°	10°
Q	130	130	130	Q	5 3/32	5 3/32	5 3/32

Fig. 45: Dimensions of the punching saddles

8. Regrinding Punching Tools

Regrind punching tools on their front faces only, for otherwise the clearance between punch and die will be changed. To increase service life of the tools, regularly grease the cutting edges.

In many cases it is easier and more advisable to order new tools, for this will be more favourable, and guarantee correct grinding.

9. Special Tools

Due to our comprehensive MUBEA Toola Programme, all mostly required special tools are available at short notice. Furthermore, the special design of the MUBEA punch enables versatile application of special tools which, however, cannot be described as short summary.

a) Special Equipment for Punches and Dies of up to 40 mm diameter for HPSN 350/500

All punching tools, such as tools for round, square, rectangular, and oblong holes of up to 40 mm diameter can be used with this tool receptacle.

The entire equipment comprises: punch holder, M52 quick-change chuck with 40 mm passage, insert bushing with 40 mm passage, saddle with 40 mm receptacle, die holder, and stripper.

On the HPSN 750 model, punching tools of up to 70 mm can be used. The entire equipment consists of: punch holder, stripper, and saddle with 70 mm receptacle.

When ordering tools, please specify both thickness and tensile strength of the material to be processed.

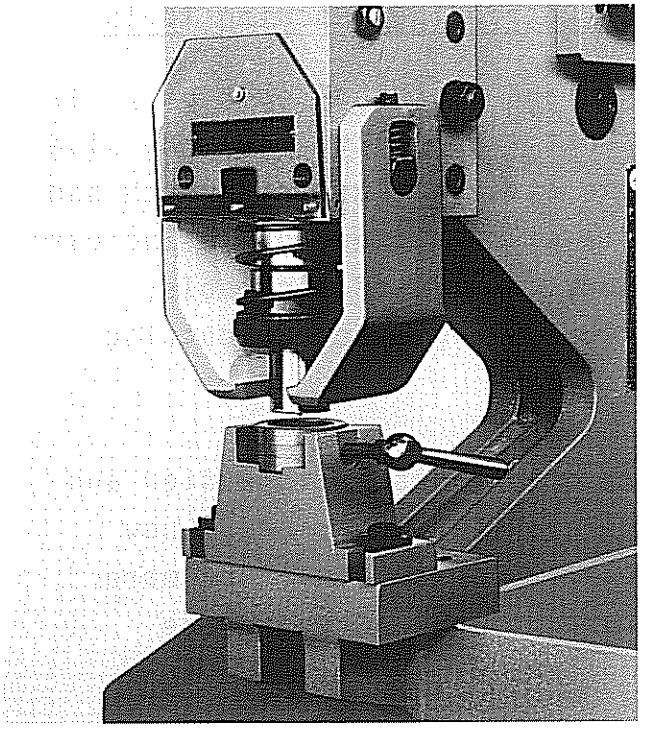


Fig. 46: Special punching equipment for punches and dies of up to 40 mm dia.

MAINTENANCE PRESCRIPTIONS
for HYDRAULIC PLANT

A. General

For functioning and service life of the hydraulic plant it is extremely important to observe the following maintenance prescriptions.

B. Filling up the Oil Reservoir

Before starting oil level of the oil reservoir should be checked. The oil level shall be about 3 cm below the reservoir cover. Checking is performed by means of the gauge stick at the filling filter. Filling should be carried out only via the filter element. After filling, the filler has to be perfectly closed.

For filling the plant there has to be used only highgrade branded hydraulic oil. At medium ambient temperatures (5°C to 35°C) there should be employed H y d r a u l i c O i l H L P 46 (Viscosity classification: ISO VG 46 DIN 51 519). At extreme low or high temperature, the manufacturer should be consulted.

All reputable oil manufacturers supply suitable oils. As mixing of the hydraulic oil of various manufacturers is not advisable, there should be always refilled the same type. The oil type of machines filled in the factory is stated on the oil reservoir.

C. Starting

At setting plant into operation there has by all means to be observed the correct direction of rotation of the motor. To avoid damages of the pump, the motor must start up in inching operation. The engagements should then not be actuated. When having ascertained the correct direction of rotation, the motor must be kept running for about 3 to 4 min. without actuating the engagements. To ensure escaping of the air eventually existing in the system, each cylinder has afterwards to be moved out and in repeatedly without loading over the whole stroke. After perfect venting the plant can be started up under load.

The max. operating pressure adjusted in the factory is specified on the reference plate at the oil reservoir. Checking of the pressure can be carried out by means of a manometer at the measuring connection above the oil reservoir.

The stated max. operating pressure should not be exceeded.

D. Maintenance

Current checking of the oil level in the oil reservoir is necessary in order to avoid greater damages.

After approx. 10 operating hours the return filter fixed on the oil reservoir has to be cleaned for the first time. Cleaning should be done in rinsing oil or petroleum.

Throw-away filter cartridges have to be replaced. After having fitted the clean resp. new filter element the plant is again ready for work. Further filter cleaning should be done at normal fouling about every 600 operating hours.

The first oil change should be carried out after approx. 600 operating hours. Afterwards the oil has to be renewed every 1 200 to 1 500 operating hours. After draining of the waste oil, the oil reservoir and the whole system have to be cleaned with rinsing oil. Water, leaches and petroleum are not suitable as purifying agents. After complete cleaning the plant has to be closed and to be filled up with new, unused hydraulic oil. All filters have to be cleaned at every oil change. Of course, there has to be taken care of greatest cleanliness when refilling.

During operation there have to be permanently controlled the oil level, the leakage of the plant, the fastening of the units and pipes as well as state of the hydraulic oil and the filters.

E. Eliminating troubles

Fault 1: Excessive noise in the plant

Cause	Reason	Elimination
1.1 Cavitation in the pump	1.1.1 Hydraulic oil too cold (below + 5°C)	Heat the hydraulic oil to the temperature of + 5°C
	1.1.2 Viscosity of the hydraulic oil is too high	Replace the hydraulic oil by a suitable one (see section "Filling up the Oil Reservoir")
	1.1.3 Steam generation	The max. oil temperature of + 70°C is exceeded. Refill hydraulic oil or replace it by prescribed one
	1.1.4 Failure of the pump	Exchange the pump
	1.1.5 Sealed reservoir	Clean vent-filter in the cover of the filler
1.2 Foam formation or air pockets in the pressure fluid	1.2.1 Pressure fluid level in the reservoir is too low	Fill up on the correct level
	1.2.2 Wrong hydraulic oil	Replace by suitable oil
	1.2.3 Entering of air caused by the screwed joints in the suction pipe	Retighten or replace the screwed joints
1.3 Mechanical vibrations	1.3.1 Vibrations of the pipings	Retighten the attachments
1.3.1 Pump	1.3.1.1 Used up or damaged	Replace
1.3.2 Drive motor	1.3.2.1 Used up or damaged	Repair or replace
1.3.3 Safety or pressure limiting valve	1.3.3.1 Flatters	Adjust correctly or replace

Fault 2: No pressure or unsufficient pressure

Cause	Reason	Elimination
2.1 Pump does not feed correctly	2.1.1 Air enters into the suction pipe	See 1.2.3
2.2 High pump temperature	2.2.1 Used up or damaged pump	Replace the pump
	2.2.2 Unsufficient viscosity of the hydraulic oil	See 1.1.3
2.3 Leakage losses of the pressure side in the return motion	2.3.1 Mechanic control valve not connected through	Reset limitations of the engaging path
	2.3.2 Wrong adjustment of the pressure	Correct the adjustment
	2.3.3 Safety valve does not shut as there are dirt and defective parts	Clean, ascertain the damage, replace or renew
	2.3.4 Way valve open as there are dirt or defective parts electric fault	Clean the damaged unit, repair or replace
	2.3.5 Damaged cylinder bore, piston rod or piston seal	Renew the damaged parts
2.4 Failure of the pump	2.4.1 Damaged pump, defective drive, unsuitable viscosity of the liquid, etc.	See faults 1.3.1.1, 1.1.2

Fault 3: Anomalous pressure or flow fluctuations and vibrations

Cause	Reason	Elimination
3.1 Cavitation in the pump	3.1.1 See faults 1.1.1 to 1.1.5	See faults 1.1.1 to 1.1.5
3.2 Foam formation or air pockets in the liquid	3.2.1 See faults 1.2.1 to 1.2.3	See faults 1.2.1 to 1.2.3
3.3 Mechanic vibrations	3.3.1 See faults 1.3.1	See faults 1.3.1
3.4 Flattering pressure limitating or safety valves	3.4.1 See faults 1.3.3.1	See faults 1.3.3.1
	3.4.2 Damaged valve seat	Repair or renew
3.5 Valves seize	3.5.1 Fouling	Drain the hydraulic oil, clean plant and parts, fill up with clean oil
	3.5.2 Defective or distorted	Replace the unit, eliminate distortion
3.6 Air pockets in the plant which cause irregular or yielding motion	3.6.1 Plant is not completely vented	Vent the plant (see section "Starting")
	3.6.2 Electric equipment defective	Trace and eliminate the error

Fault 4: Unsufficient or no feed current

Cause	Reason	Elimination
4.1 Cavitation in the pump	4.1.1 See faults 1.1.1 to 1.1.5	See faults 1.1.1 to 1.1.5
4.2 Foam formation or air pockets in the pressure liquid	4.2.1 See faults 1.2.1 to 1.2.3	See faults 1.2.1 to 1.2.3
4.3 Used up pump	4.3.1 See faults 1.1.4	See faults 1.1.4
4.4 Leak losses from the pressure side in the return motion	4.4.1 See faults 2.3.1 to 2.3.5	See faults 2.3.1 to 2.3.5
4.5 Pump rotates in the wrong direction	4.5.1 Wrong direction of rotation of the motor	Reverse polarity of the electric connections

Fault 5: Too high temperature of the pressure fluid

Cause	Reason	Elimination
5.1 Overflow losses	5.1.1 Pressure adjustment too high	Correct the adjustment
5.2 Leak losses from the pressure side in the return motion	5.2.1 Bad functioning of the valves and defective seals	See faults 2.3.1 to 2.3.5
	5.2.2 Wrong viscosity of the hydraulic oil (too low, too high)	Drain the hydraulic oil and use the prescribed oil
5.3 Overheated pump	5.3.1 Wear of the pump	Replace the pump
5.4 Too quick circulation of the pressure fluid	5.4.1 Pressure fluid level has become too low in the plant	Filling up of the plant on the prescribed level (see section "Filling up the Oil Reservoir")