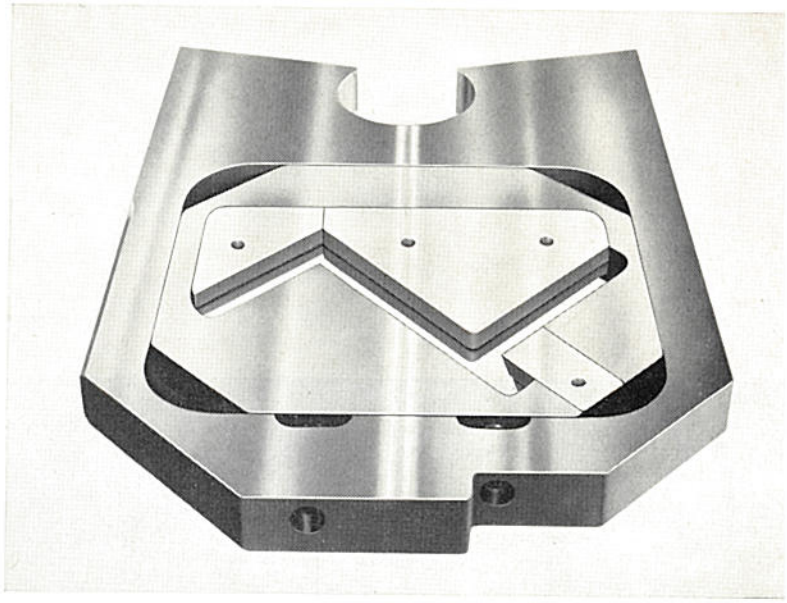
The Section Shear

Fig. 42: Secure retainment of the movable section knife in the section slide



1. General

As a particularly advantageous feature the section shear has a very long and sturdy slide. The movable section knife is fixed in a recess in the slide. The knife proper does not move, so that damage to the knives is not possible.

2. Adjustment of the Slide Guides

The guides on which the long slide moves are of special purpose material and are adjustable, thus insuring correct alignment on all sides even after prolonged operation – an essential feature of safety in view of the great forces encountered in the section shear.

Adjustment is made as follows:

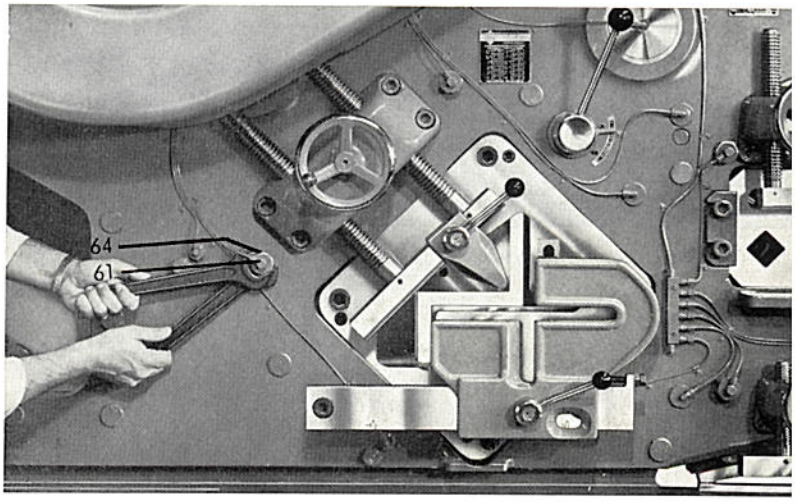


Fig. 43: Adjustment of the slide guides across the machine

For Size 0 (11)

a) Adjustment across the machine:

Loosen 4 lock nuts No. 64 by turning to the left, tighten the slide adjusting screws 61 until a marked resistance is felt, then releasing the screws by backing off a $^1/_{16}$ turn, and tighten the lock nuts 64.

b) Adjustment along the faces:

Loosen two hex head bolts No. 40 on the back side of the machine and two set screws No. 42 on the front side.

Tightening the two set screws No. 41 from the throat of the punch and the inclined plate feed-through channel at the back of the machine. When a marked resistance is felt, release the set screws No. 41 by giving them a $^1/_{16}$ turn. Then securely tighten the set screws No. 42 and hex head bolts No. 40.

Fig. 44: Adjustment along the faces of the slide guides, size 0 (11)

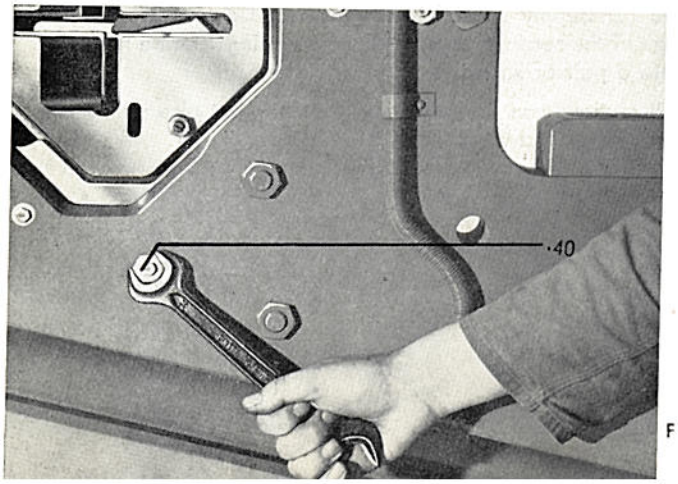
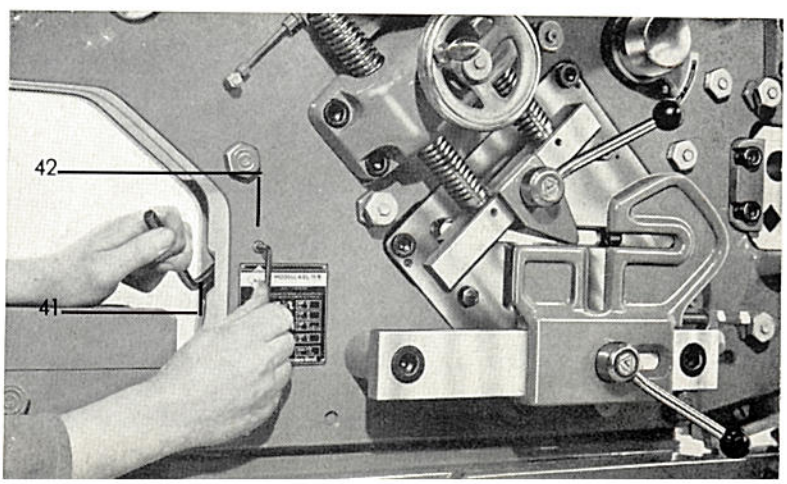


Fig. 45: Adjustment along the faces of the slide guide, size 0 (11)



For Sizes 1/2 thru 3 1/2 (13–25)

a) Adjustment across the machine:
See under Size "0" (11)

b) Adjustment along the faces:

Loosen 2 hex head bolts No. 36 on the back side of the machine by three full left-hand turns and 2 hex head bolts No. 40 on the front side by one full left-hand turn. Tighten 2 hex head bolts No. 35 on the front side until a marked resistance is felt. Then release hex head bolts No. 35 by giving them a 1/4 turn to the left and securely tighten hex head bolts No. 36 and No. 40.

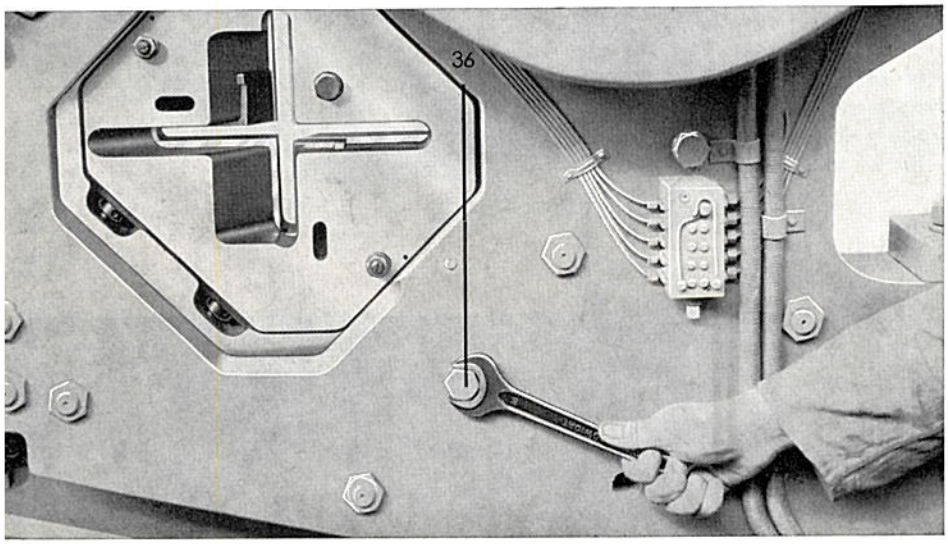


Fig. 46: Adjustment along the faces of the slide guides

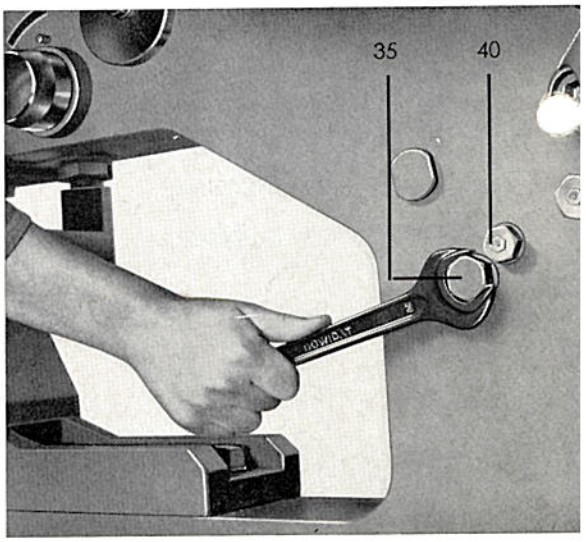


Fig. 47: Adjustment along the faces of the slide guides

3. Removal of Scale

It is recommended to clean the scale channel in the machine regularly with gasoline or solvent.

4. Designs of Knives

a) Normal Design

Knives for cutting angles and tees are standard equipment. For a detailed description, including maintenance and operating instructions, see the following pages.

b) Special Designs

For cutting channels, I-beams, zees, or other special sections, we can supply special section knives. Depending upon the size of the sections, several cutting openings can be machined into a pair of knives.

All sections can be cut not only at 90°, but also with mitres on flanges and webs.

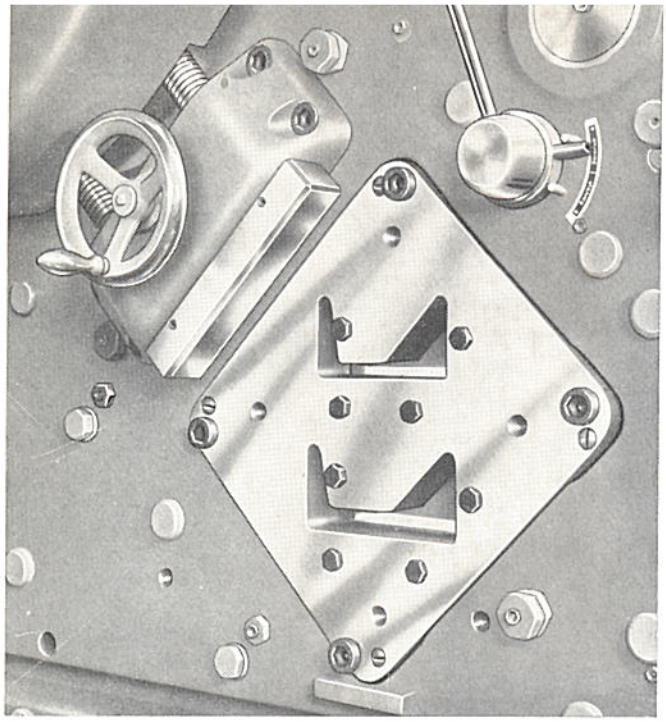


Fig. 48: Section knives for channels – Execution PMF

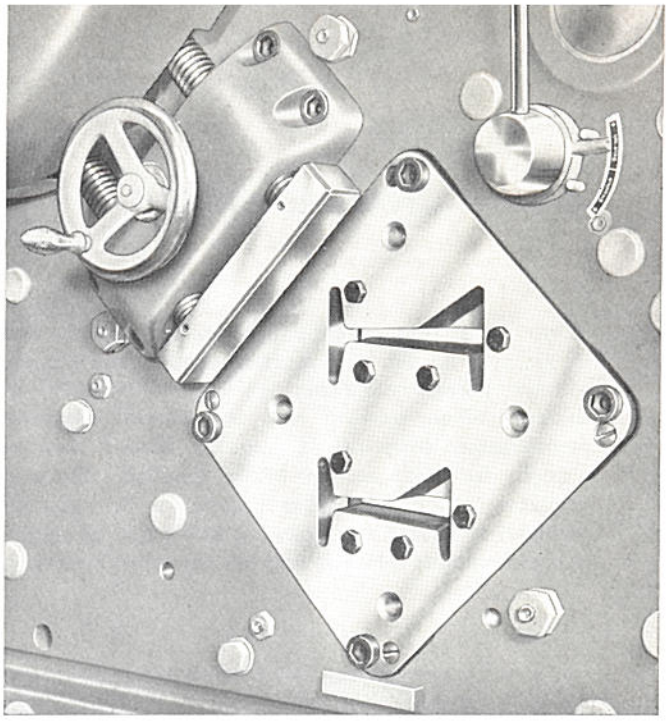


Fig. 49: Section knives for beams – Execution PMF

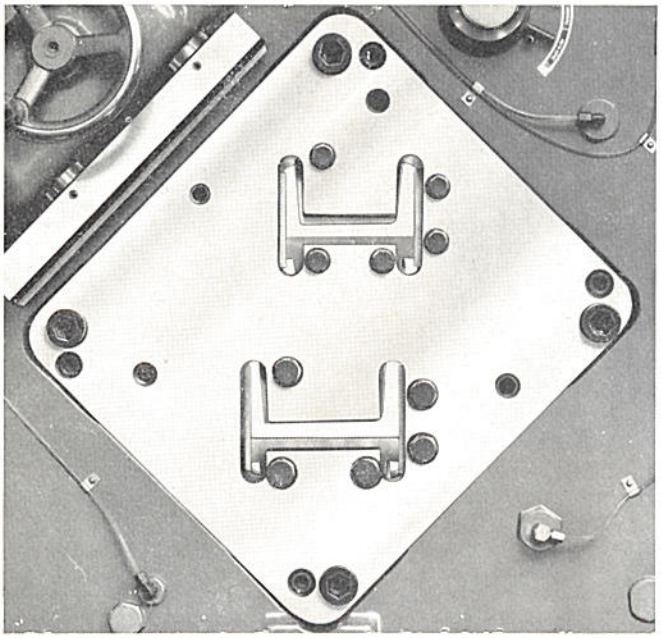


Fig. 50: Combined Section knife PME adjusted for channels

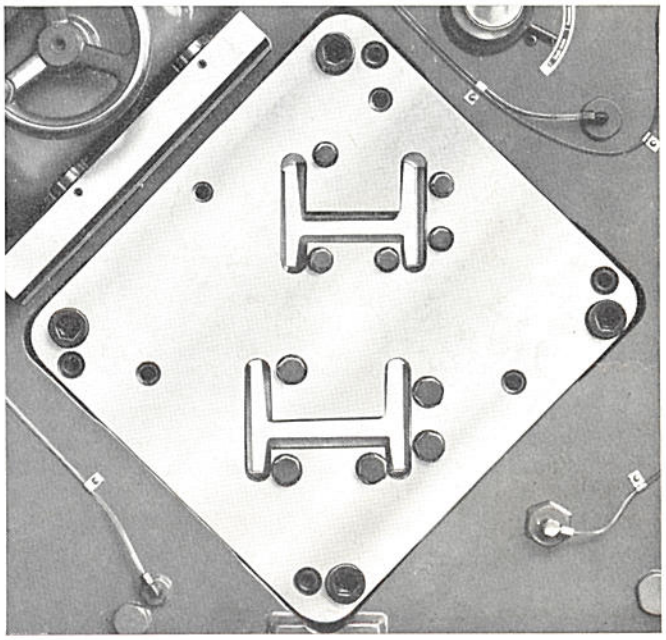


Fig. 51: Combined Section knife PME adjusted for beams

Fig. 52: Section knives for special sections on mitre (45°)

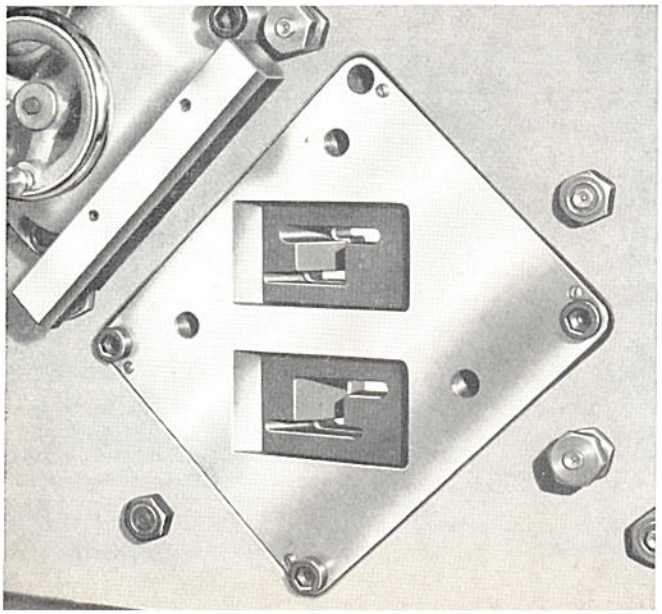
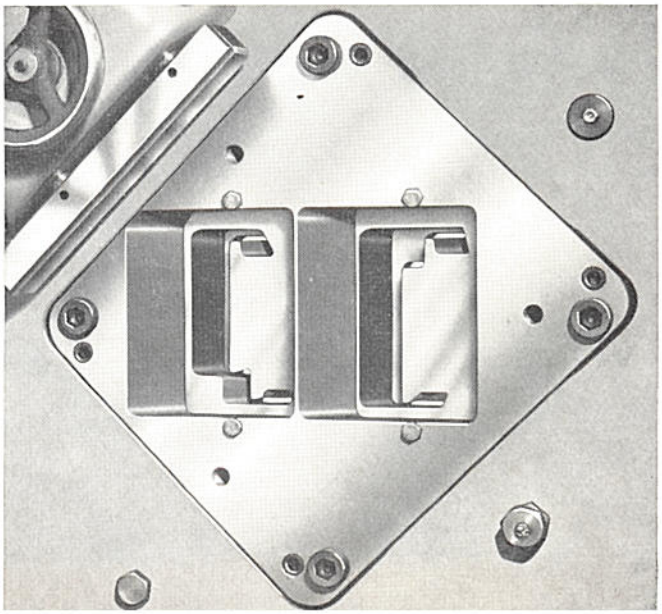


Fig. 53: Section knives for special sections on mitre (45°)



QUICK-CHANGE KNIVES

If you must often change the channels, beams and other sections to be cut, it is recommended to use Mubea quick-change knives comprising the knife frame and insertion blades. When working with this special equipment, the considerably lower-priced insertion blades only must be bought for each section to be handled. Above all, the replacement of the blades requires a few seconds only. Without any tools, the clamping levers can be released, the insertion blades removed and the new ones inserted.

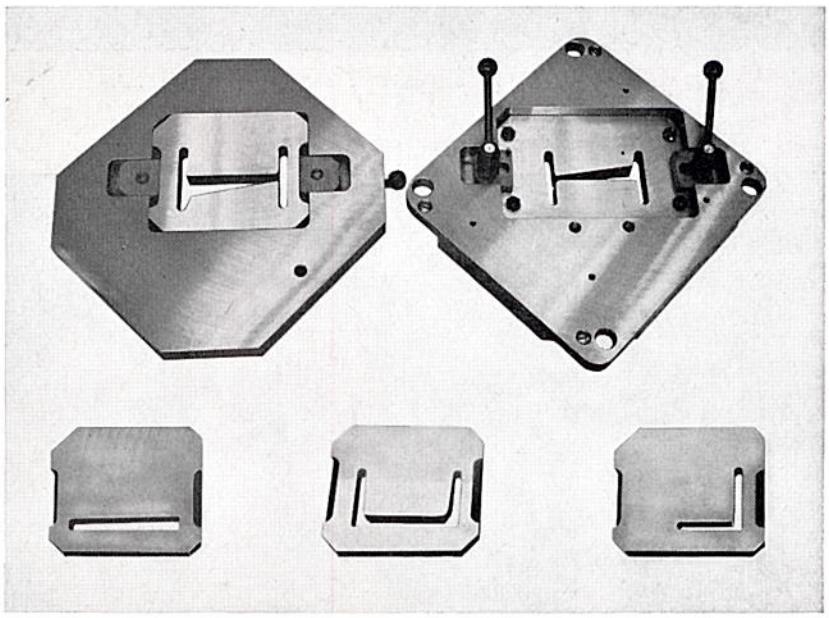


Fig. 54: Quick-change knives for section shear

Type PMA Knives

1. General

Type PMA section knives serve to cut angles and tee-sections squarely and at any mitre up to 45 degrees. The sliding blades close and open automatically and are self-adjusting to any size of section. This is an advantage when angles and tee-sections of various sizes have to be cut in a quickly alternating sequence.

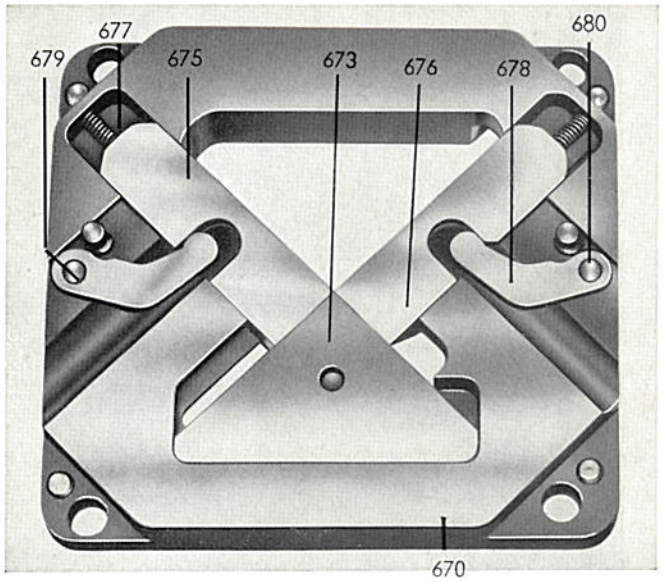


Fig. 55: Fixed type PMA section knife

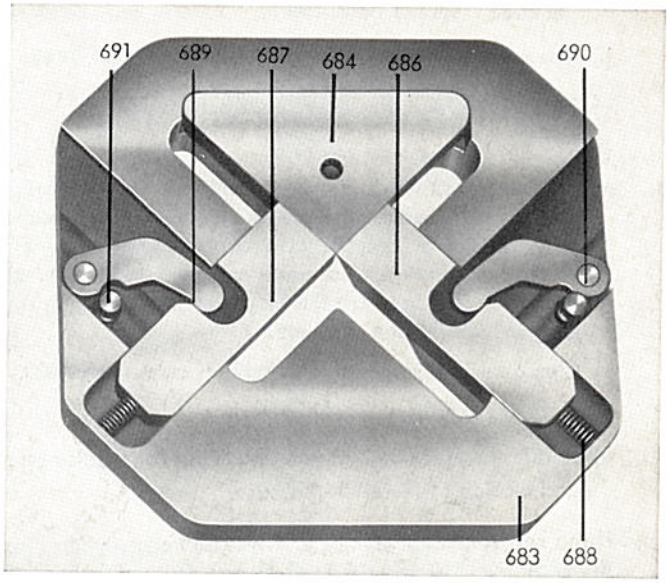


Fig. 56: Movable type PMA section knife

2. Removal of type PMA knives

a) Lower section slide until sliding blades are closed and the automatic system is relieved.

b) Lift the clamp lever 823 and remove the section stop 820 (by pulling the lever head the clamp lever can be disconnected and moved into any position desired).

c) Turn the double-spindle hold-down entirely upwards.

d) Loosen 4 socket head screws 671 (do not change the position of the set screws 672).

e) Withdraw the fixed section knive 670 from the machine body.

f) Loosen the cross-slit screws 326 in the section slide 325.

g) Withdraw the movable section knife 683 from the machine (if the knives shall be cleaned only, the knife 683 may remain in place). For dismantling and installation of section knife parts see para. 4, page PMA 2 E.

Fig. 57: Type PMA section knife seen from body side

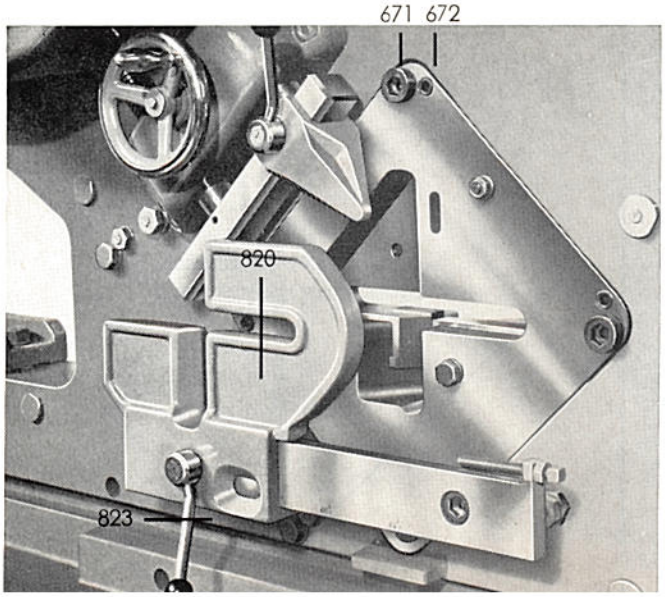
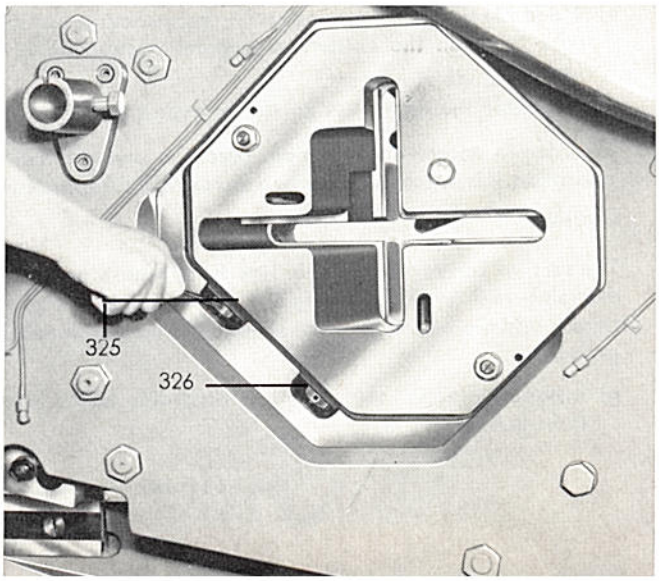


Fig. 58: Type PMA section knife seen from cover plate side



3. Installation of Type PMA Knives

a) Insert movable section knife 683 into section slide and push to the rear against the stop.

b) Tighten cross-slit screw 326.

c) Turn section slide 325 downward for about $^1/_3$ of its stroke so that the adjusting eccentrics 680 and 691 do not touch the slide levers 678 and 689.

d) Insert the stationary section knife 670 into the body.

e) Securely tighten the socket head screws 672.

f) Tighten headless screws 672.

g) Release socket head screws 671 one full turn and retighten all of the 4 headles screws 672 by giving them about $^1/_2$ of a turn. This is necessary to avoid compressing of the knives and maintain a shearing gap. After this please check the play between the blocks by a feeler gauge which is supplied with the machine.

h) Clamp section stop 820 by means of clamp lever 823.

i) Tighten solidely socket head screws 671.

k) Rotate the machine by hand and check for regular opening and closing of the sliding blades.

If the knives close irregularly, it will be necessary to readjust the eccentrics 680 and 691 by R. H. or L. H. turning. For moving the adjusting eccentrics, loosen the lock nuts and re-tighten them after the adjustment is finished.

The adjustment is correct if the sliding blades have just fully opened in the upper position of the slide or are tightly closed when the slide is in its bottom position.

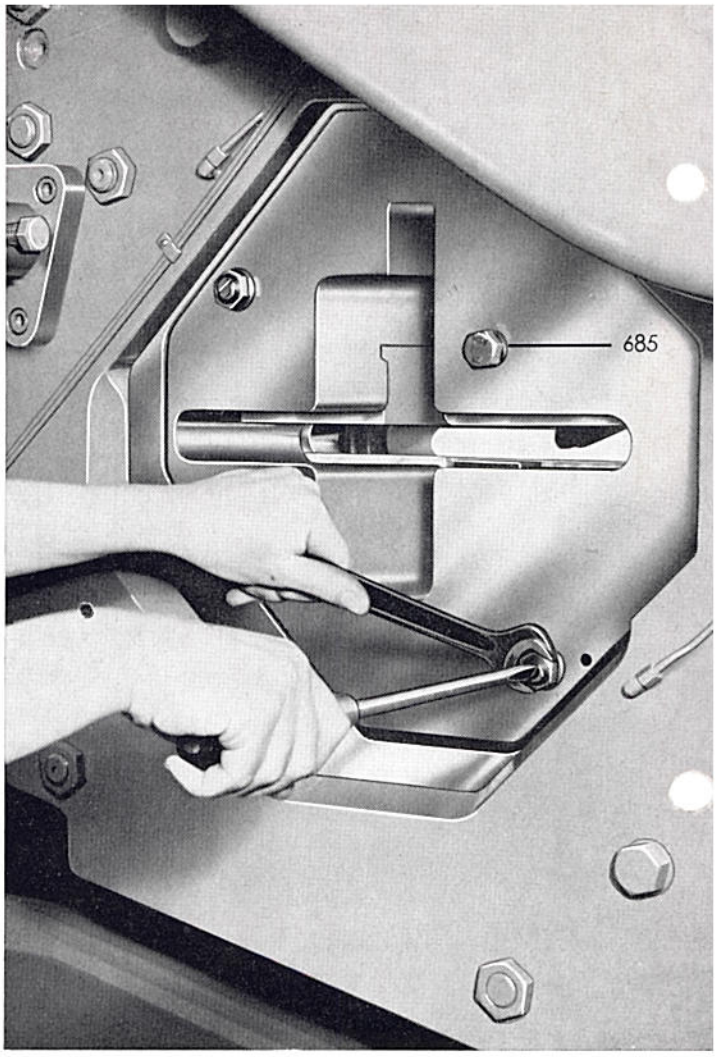


Fig. 59: Adjusting the sliding blades

4. Cleaning the Section Knives

The type PMA knives must be carefully serviced and cleaned.

Since the sliding blades are spring-operated, contamination may result in a failure of the automatic system, which in turn causes poor cuts or even breakage of the knives. Therefore, watch the function of the knives closely and clean them in time.

a) Withdrawal of the section knives according to the instructions under para. 2.

b) Remove slide levers 678 and 689.

c) Remove sliding blades 675, 676, 686, 687 from their holders.

d) Remove springs 677 and 688 from the sliding blades.

e) Clean the sliding blades and section knives, taking particular care to clean the holders to prevent obstruction of the sliding blade movement.

f) Assemble the type PMA knives in reverse order.

In order to ensure and maintain precision and continuity in operation, it is important that you insist on MUBEA spare knives.

Caution:

The section knives must remain free from grease to keep the dropping mill scale dry. Only the rear sides of the sliding blades and the bearings of the slide levers have to be slightly greased.

g) Installation of the section knives according to the instructions under para. 3.

5. Regrinding the Section Knives

The sliding and insertion blades must only be reground at their cutting faces, i. e. uniformly at all faces to keep the cross shape concentric. Naturally, grinding must only be done as far as the stroke of the section slide permits, i. e. the cross must be completely closed when the section slide is in its bottom position.

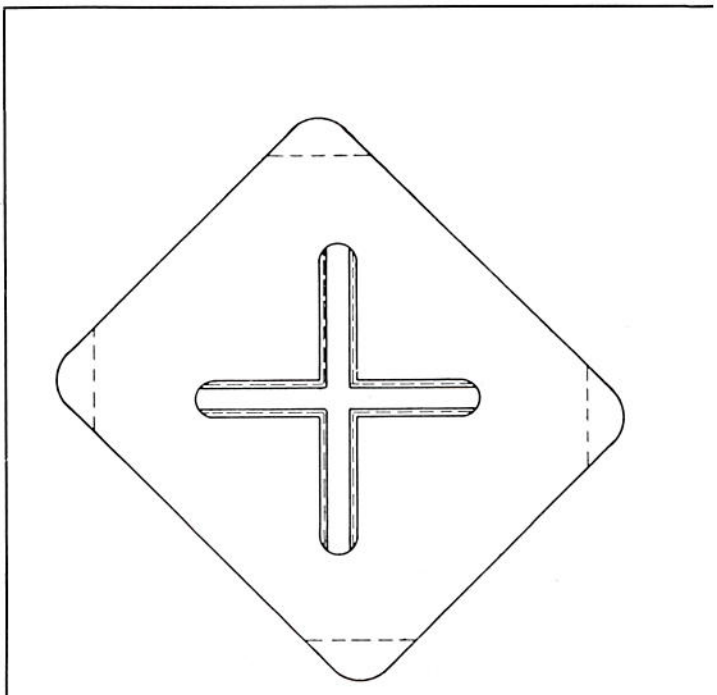


Fig. 60: Regrind knives uniformly

The part number (which also is the Order No.) is stamped on the knives. Remember that MUBEA knives are of special quality, so it pays to specify MUBEA brand when ordering spare parts.

The sliding and insertion blades are pointed so that all sections — even sharp-edged ones — can be cut. For cutting angles of a certain size having root fillets, the insertion blade 684 can be provided with a radius corresponding to the fillet. Squeezing at the section root is thus eliminated.

We supply these insertion blades also with various radii — from the smallest up to the maximum capacity of the machine, always grouping several section sizes together. Please state in your order what kind of angles is to be cut or whether tee-sections are to be handled.

By turning the slide a little bit down, the insertion blades can be removed without dismantling the section knives.

6. Converting Type PMA into Type PMB Knives

For larger batches of identical section sizes, use type PMB knives (designed as type PMA but without using the automatic system) or the still more robust type PMG knives. These knives operate almost free of maintenance and are thus more economical for identical dimensions.

Type PMA knives are converted into type PMB knives by removing the automatic system and inserting other sliding blades knives.

a) New parts to be ordered:
   1 sliding blade each 705, 706, 711, 712
   1 insertion blade each 703, 709
   2 hex head screws 707
   2 hex head screws 713
   1 hex head screw each 704, 710
   4 safety plates 714
   4 lock washers 715

b) parts to be removed from type PMA knives:
   sliding blades 675, 676, 686, 687
   Insertion blades 673, 684
   Slide levers 678, 689
   Compression springs 677, 688

c) install the parts ordered under a) into the section knives 670 and 683.

d) Rotate the machine by hand and check for satisfactory function

The adjustment of the sliding blades for the various cuts is explained in the instructions for type PMB knives.

7. Cutting with Type PMA Knives

a) Inserting the sections:

Insert the section into the section opening (the section must abut against the right-hand side of the opening and slightly touch the horizontal sliding blade of the stationary knife but without clamping it). An adjustment of the knives is not necessary.

The cutting instructions below demonstrate the way in which square and mitre cuts are made.

The sliding blades are spring-operated. Particularly when cutting heavy sections, make sure that the sliding blades are not blocked. Support long section rods to avoid pressure on the sliding blades. Do not clamp the hold-down too tightly. There must be a little gap between the section and the hold-down.

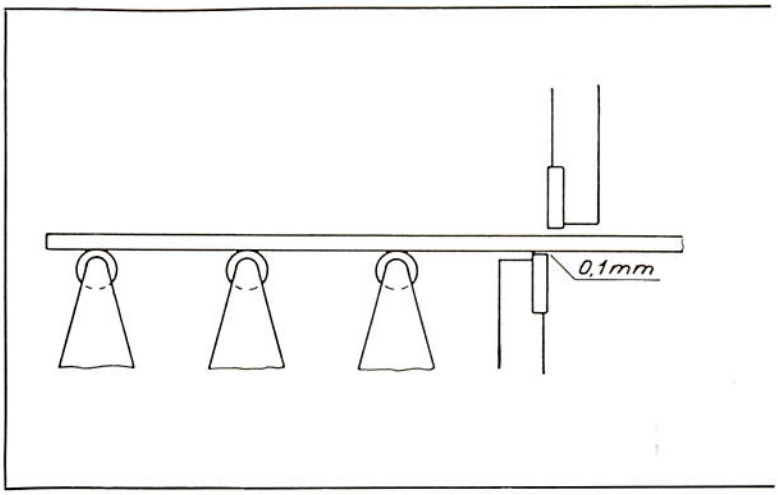


Fig. 61: Inserting an angle

b) Hold-Down and Section Stop

The section stop 820 on the stop rail 827 can be adjusted to square or mitre cuts up to 45 degrees by means of a scale. It is clamped in the desired position by means of the clamp lever 823.

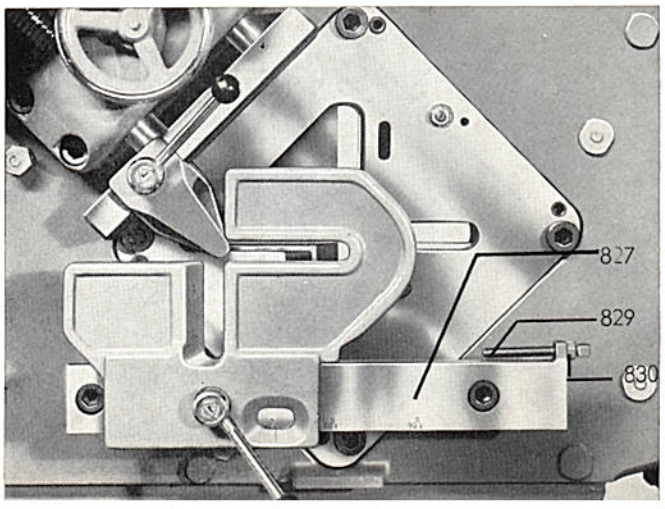


Fig. 62: Section stop for mitre 45 degrees

For square (90 degrees) cuts there is a stop bolt 829 with a lock nut 830 at the right-hand side of the stop rail 827. Simply move the section stop against the stop bolt and you have the correct lateral position of the work.

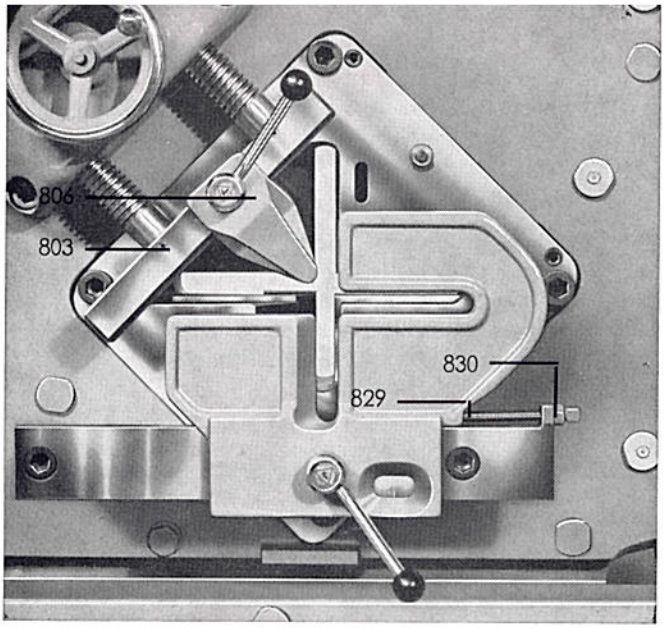


Fig. 63: Section stop for square (90 degrees) cuts

The correct vertical position of the section is adjusted by means of the double-spindle hold-down. Move the thrust block 806 on the cross-beam 803 so that it hits the section root with its tip when the hold-down is lowered.

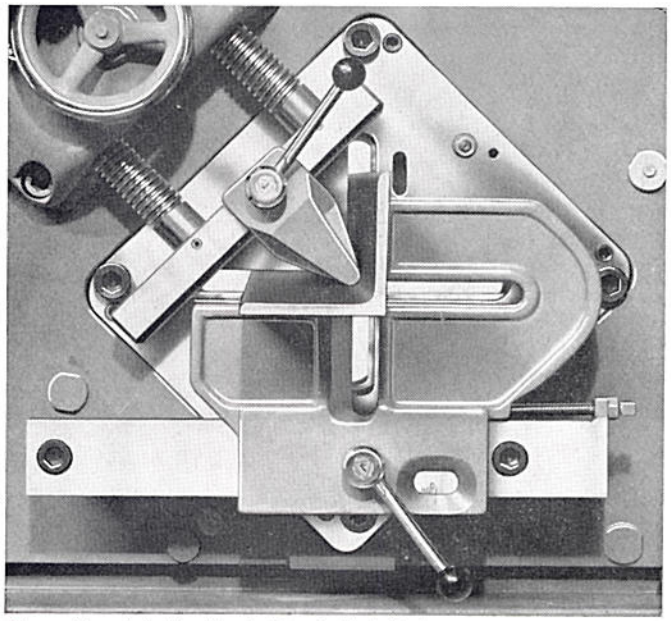


Fig. 64: Adjusting the double-spindle hold-down

The vertical position of the section is correct if the section is in a horizontal position during cutting.

When out-of-angle vertical or horizontal legs are encountered, make the necessary corrections by means of the double-spindle hold-down or section stop respectively.

c) Cutting Extremely Small Sections

When cutting extremely small angles and tee-sections with type PMA knives, make sure the position of the section within the knife opening is correct. Sections may be brought out of line by jumping sliding blades and hence get deformed during cutting.

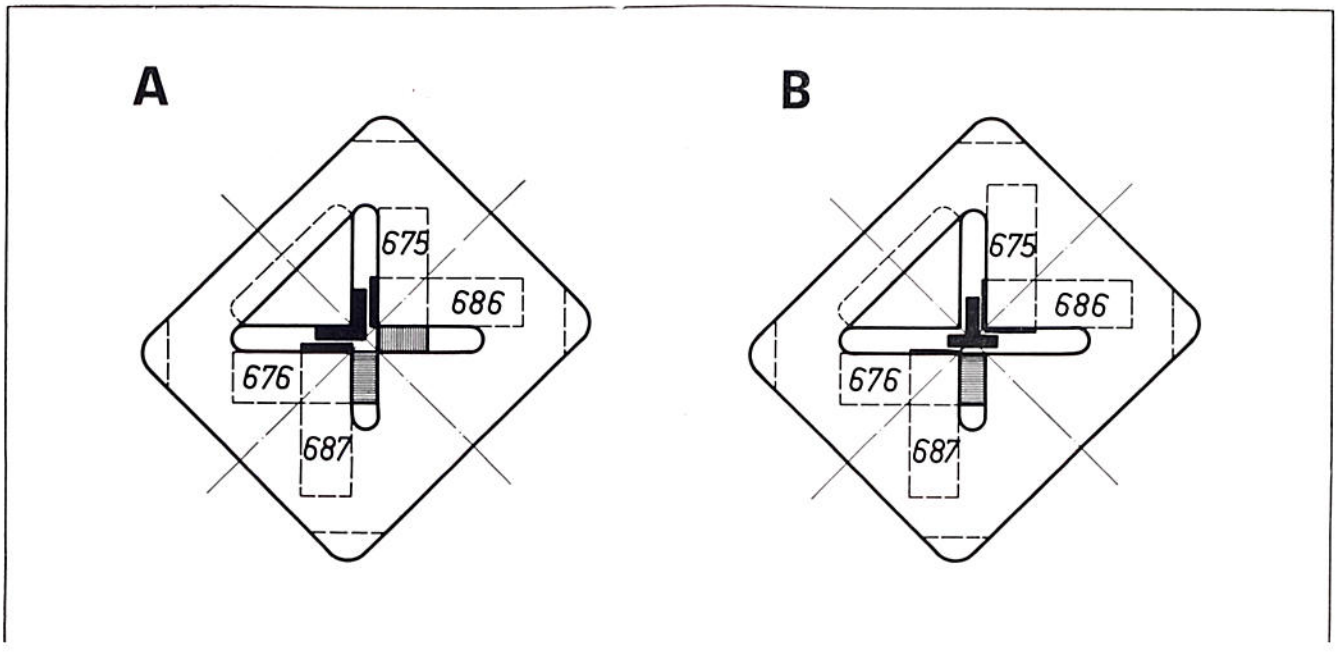
Note:

Place smaller angles against the fixed cutting insert of the movable knife (Fig. A), whereas small tee-sections must be held in the middle of the knife opening (Fig. B).

If there is a larger batch of small sections to be cut, it is advisable to set the adjusting eccentrics 680 and 691 in such a way as to make the sliding blades open only so far that the small sections can be inserted.

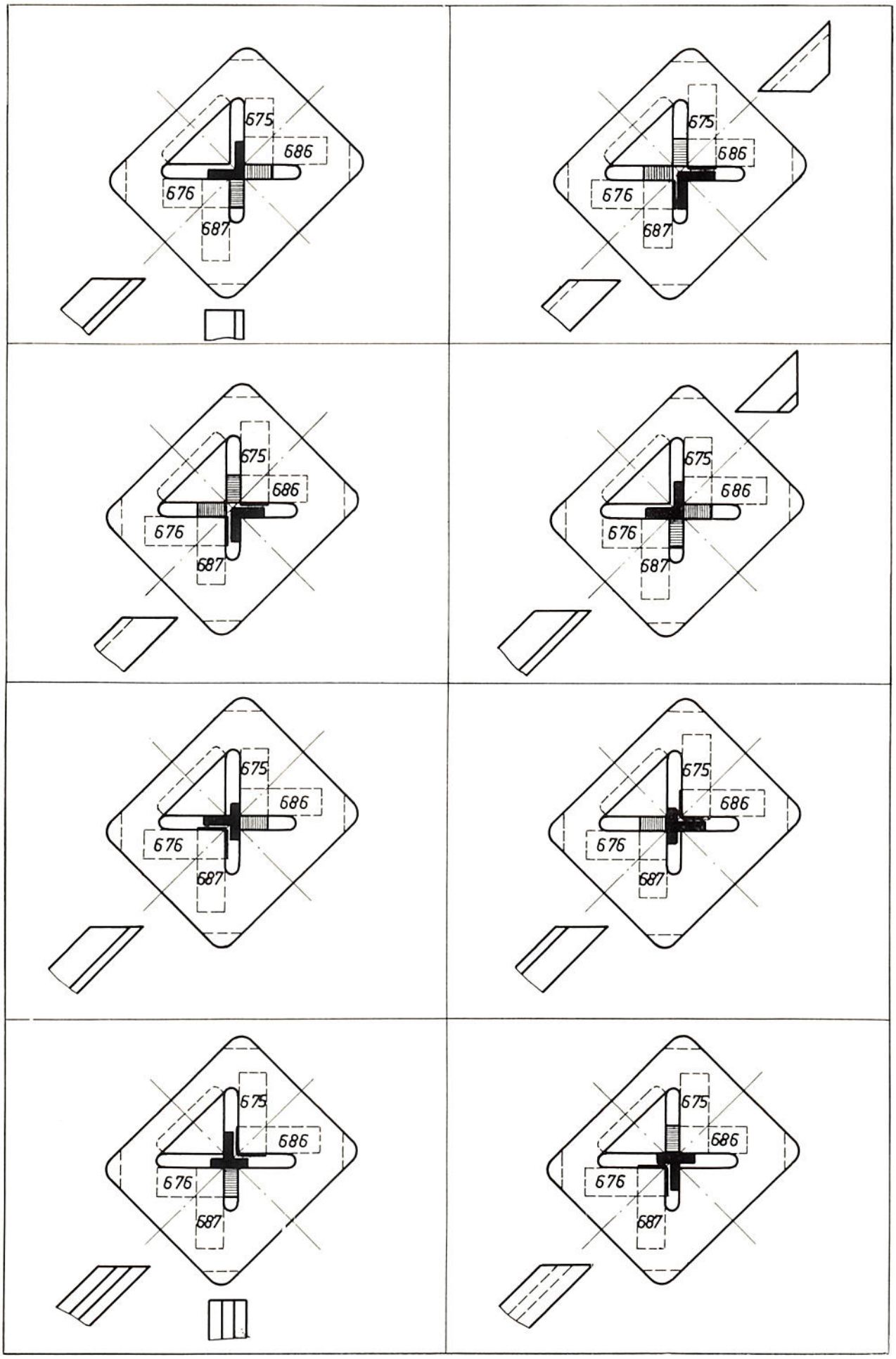
If the small sections are to be cut only squarely, it is recommended to obtain special knives for the bar shear to keep the section shear free for larger sections.

Fig. 65: Cutting small angles and tee-sections



d) Cutting Instructions:

You will find instructions on the correct insertion of sections for the various kinds of cuts in the table contained in the general cutting instructions.



Type PMB Knives

1. General

Type PMB section knives serve to cut angles and tee-sections squarely and at any mitre angle up to 45 degrees. The sliding blades are manually adjusted to the size of section to be handled (see CUTTING INSTRUCTIONS).

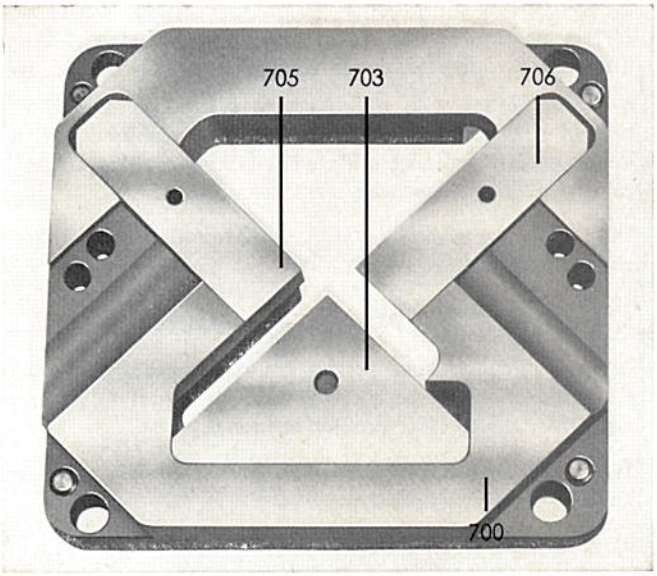


Fig. 66: Stationary type PMB section knife

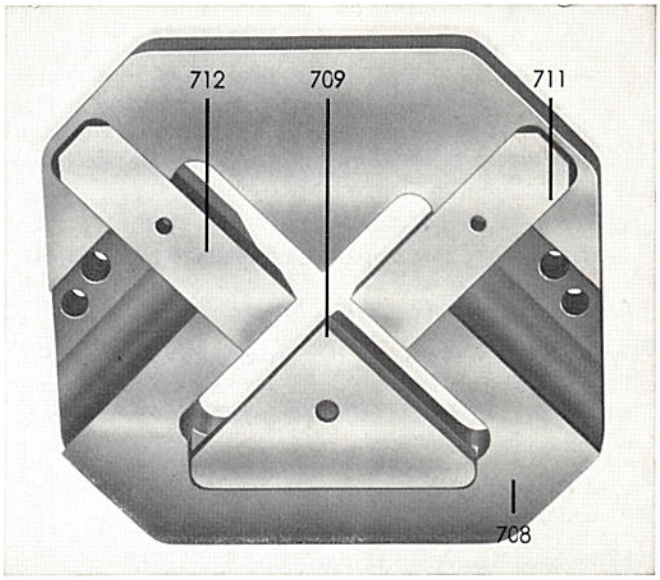


Fig. 67: Movable type PMB section knife

2. Removal of Type PMB Knives

a) Release clamp lever 823 and remove section stop 820. (By pulling the lever head the clamp lever can be disconnected and turned into any position desired).

b) Screw the double-spindle hold-down entirely up.

c) Loosen 4 socket head screws 701 (set screws).

d) Remove the stationary section knife 700 from the machine body.

e) Loosen the cross-slit screw 326 in the section slide 325.

f) Remove the movable section knife 708 from the machine. (If the knives are to be cleaned only, the movable knife 708 may remain in place).

Fig. 68: Type PMB section knives seen from body side

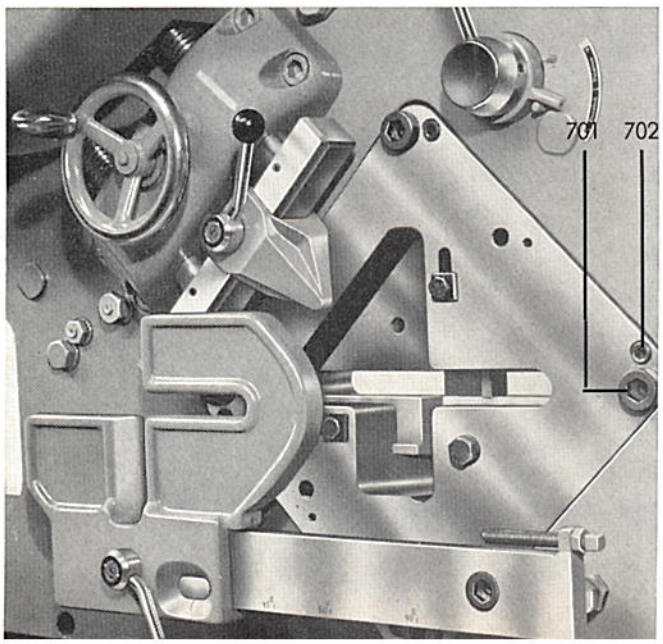
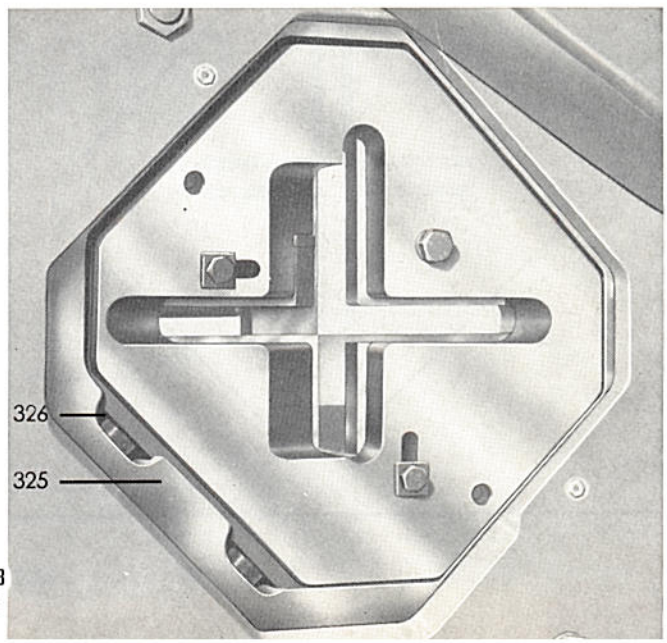


Fig. 69: Type PMB section knives seen from cover plate side



3. Installation of Type PMB Knives

a) Insert the movable section knife 708 into the section slide 325 and push it against the stop in the rear.

b) Tighten the cross-slit screw 326.

c) Insert the stationary section knife 700 into the body.

d) Securely tighten the socket head screws 701.

e) Securely tighten the headless screws 702.

f) Release the socket head screws 701 one full turn and retighten all of the 4 socket head screws by giving them about 1/2 of a right hand turn. This is necessary to prevent the knives from compressing and maintaining a shearing gap. Please check the shearing gap by feeler gauge which is supplied with the machine.

g) Tighten solidely the socket head screws 701.

h) Mount the section stop 820 and tighten the clamp lever 823.

4. Cleaning the Type PMB Knives

Type PMB knives do not require extensive maintenance as they comprise no sensitive parts. But they must be dismantled and cleaned at certain intervals depending upon the amount of mill scale encountered.

a) Remove the section knives according to the instructions under para. 2.

b) Remove the sliding blades 706, 705, 711, 712.

c) Clean the section and sliding blades thoroughly.

d) Assemble the knives.

Caution:

The section knives must be free from grease to keep the dropping mill scale dry.

e) Install the section knives according to the instructions under para. 3.

5. Regrinding the Section Knives

Regrind the sliding and insertion blades only but uniformly at their faces. On falsely ground blades, the cutting edges no longer converge at one point resulting in poor cuts.

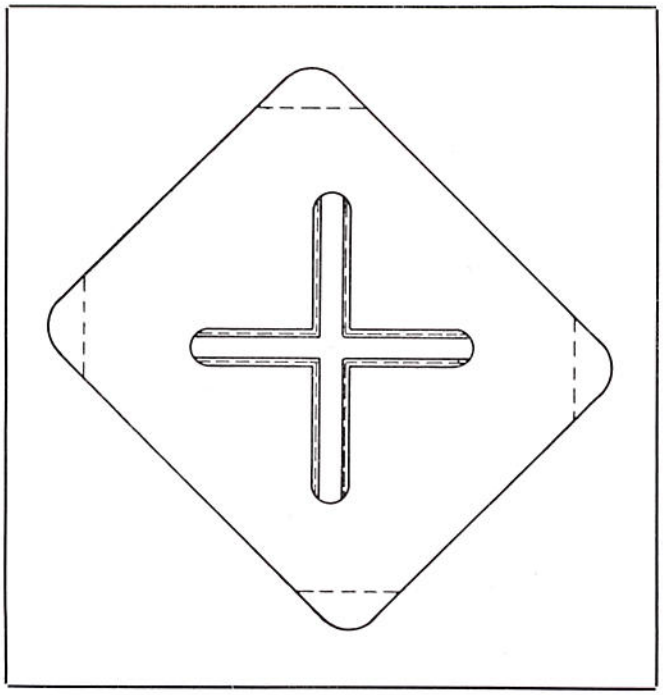


Fig. 70: Regrind the blades uniformly

Regrind the sliding and insertion blades only so far that the cutter cross fully and regularly covers the cutting edges when the slide is in its bottom position. If this is not the case, replace the blades by new ones (you will find the part numbers, which also are the Order Nos., stamped on the blades).

When ordering spare parts, always make sure to get genuine MUBEA blades made of special high-grade steel.

The sliding and insertion blades are pointed to cut all sections, even sharp-edged ones. For cutting angles of a certain size having root fillets, use insertion blades 709 with the proper radius to avoid squeezing at the section root.

Insertion blades with a full range of radii are available, several sizes of sections being grouped within this range. When ordering, please state what kind of angles are to be cut or whether tee-sections are to be handled.

The blades are exchanged without dismantling by turning the slide a little bit downward.

6. Converting Type PMB into Type PMA Knives

If you rearrange your production and various angles and tee-sections have to be cut in a quickly alternating sequence, type PMA knives offer greater economy.

Type PMB knives can readily be converted into type PMA knives.

a) New parts to be ordered:
- 1 sliding blade each 675, 676, 686, 687
- 1 insertion blade each 673, 684
- 2 slide levers each 678, 689
- 2 compression springs each 677, 688
- 2 straight pins each 679, 690
- 2 adjusting eccentrics each 680, 691
- 2 washers each 681, 692
- 2 hexagon nuts each 682, 693

b) Install the parts ordered under a) into the section knives 700 and 708 (see TYPE PMA KNIVES, para. 3.)

c) Rotate the machine by hand and check for satisfactory function.

When cutting, follow instructions for type PMA knives.

7. Cutting with Type PMB Knives

a) Insertion of Sections:

Insert the section between the opened knives for the first cut and adjust the sliding blades to the section according to instructions below. Loosen the hex head screws 707 and 713 and securely re-tighten them after the adjustment.

Make the adjustment so that a narrow clearence as left between the section and the sliding blade to permit the insertion of the section. The narrower the clearance the better the cut.

b) Hold-Down and Section Stop

The section stop 820 on the stop rail 827 can be set to 90 degrees by means of a graduation. It is clamped in the desired position by means of the clamp lever 823.

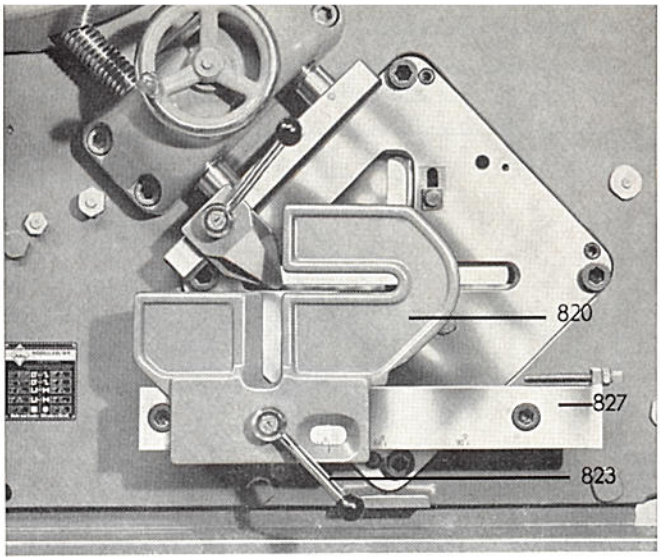


Fig. 71: Section stop for mitre cuts 45 degrees

For square (90 degrees) cuts there is a stop bolt 829 with a lock nut 830 at the right-hand side of the stop rail 827. Simply move the section stop against the stop bolt and you have the correct position of the work.

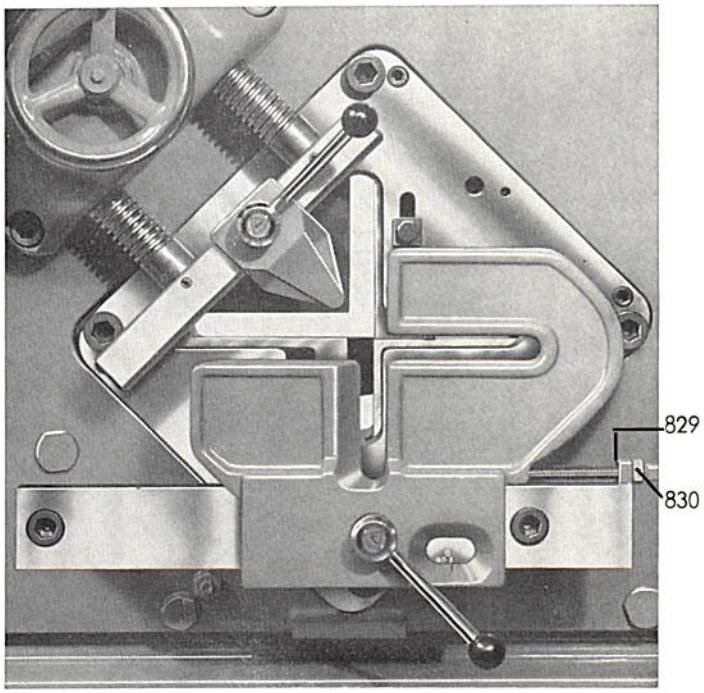
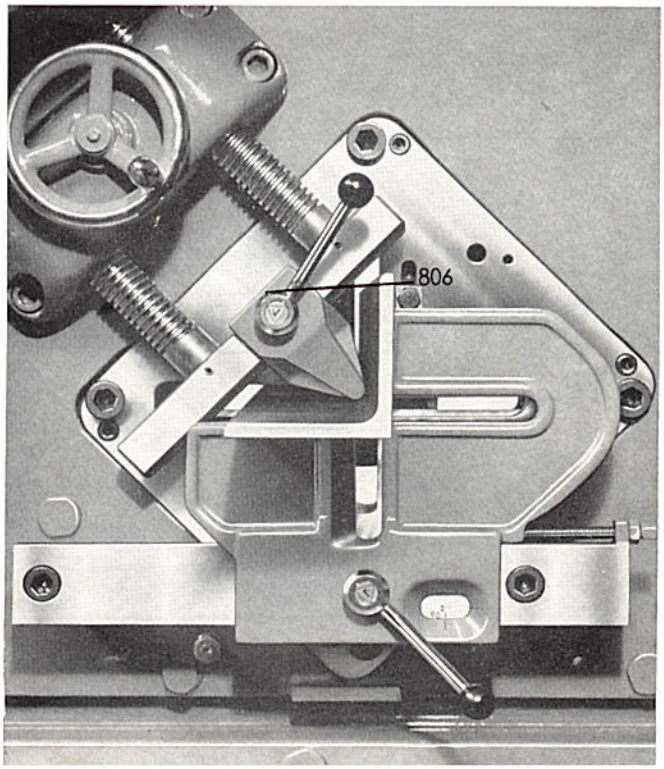


Fig. 72: Section stop for square (90 degrees) cuts

Fig. 73: Adjusting the double-spindle hold-down

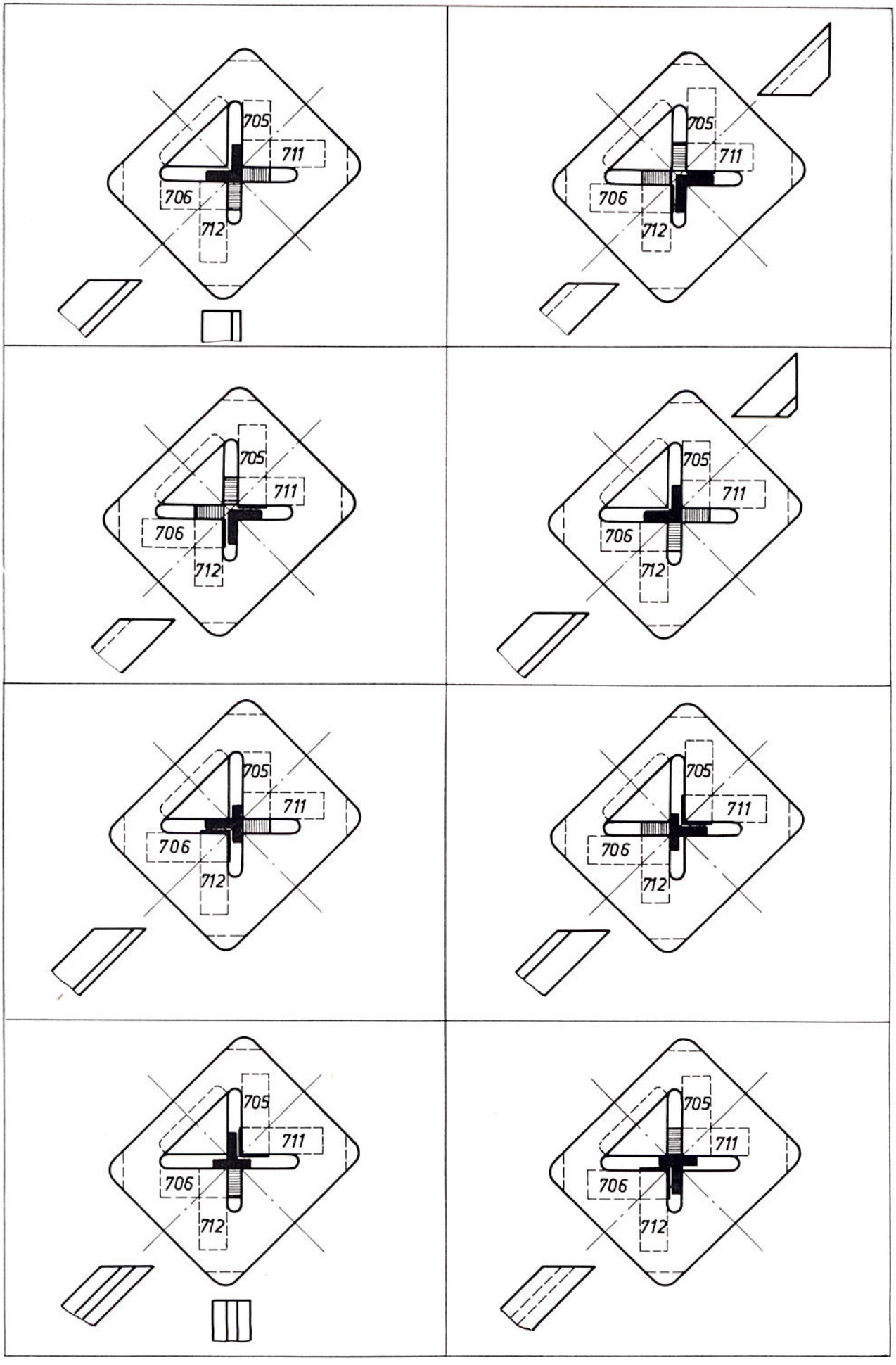
The correct vertical position of the section is adjusted by means of the double-spindle hold-down. Move the thrust block 806 on the cross-beam 803 in such a way as to make it hit the section root with its tip when the hold-down is lowered.

The vertical position of the section is correctly adjusted if the section is in a horizontal position during cutting. When out-of-angle vertical or horizontal legs are encountered, make the necessary corrections by means of the double-spindle hold-down or section stop respectively.



c) Cutting Instructions

You will find instructions on the correct insertion of the sections to be cut both squarely and at any mitre angle as well as directions for the adjustment of the sliding blades on the following page.



Type PMG Section Knives

1. General

Type PMG section knives will cut angles at 90° and at any mitre angle up to 45°. 90° cutting of tee sections can also be done on type PMG knives.

For cutting angles, no blade adjustment is necessary in changing from 90° to 45°. For cutting tee sections only two adjustable blades need be moved. These knives are extra robust and require very little servicing.

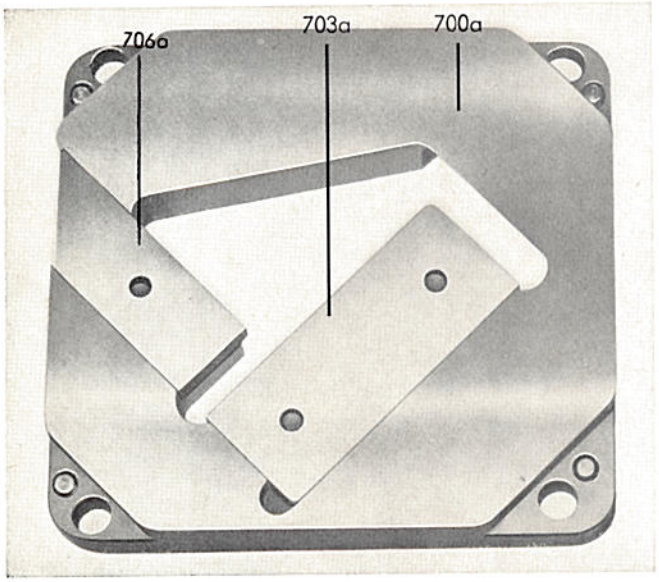


Fig. 74: Fixed PMG section knife

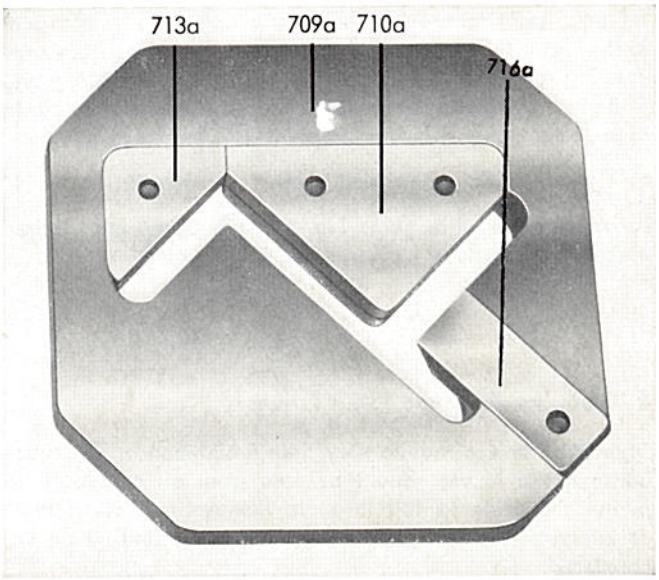


Fig. 75: Movable PMG section knife

2. Removal of Type PMG Knives

a) Loosen kip lever No. 823 and remove mitre guide No. 820. (The kip lever may be swung out of the way to any covenient position, after tightening, by grasping at the center of the swivel point and lifting.)

b) Screw the hold-down up all the way.

c) Remove 4 socket head screws No. 701a from stationary knive.

d) Withdraw the stationary section knife from the machine.

e) Loosen the screw No. 326 in the slide No. 325 on the rear side of the machine using drift punch.

f) Withdraw the movable section knife No. 709a from the machine. (If the knives are to be cleaned only, the movable knife No. 709a may remain in place.)

Fig. 76: Type PMG section knife seen from front side

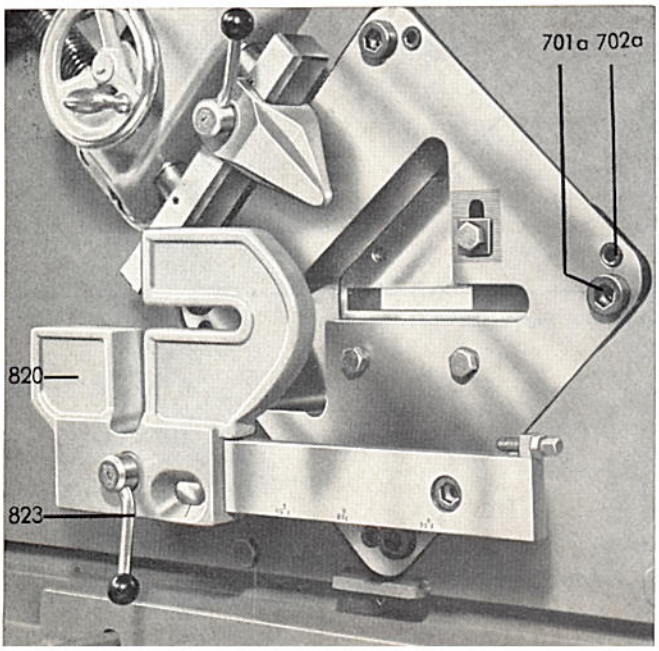
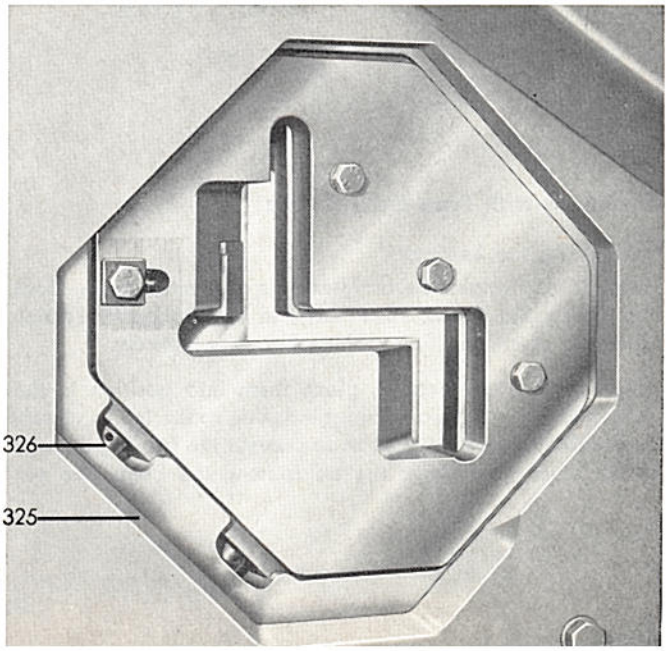


Fig. 77: Type PMG section knife seen from rear side



3. Installation of Type PMG Knives

a) Insert the movable section knife No. 709a into the section slide No. 325 and push it against the stop in the rear.

b) Tighten the screw No. 326.

c) Insert the stationary section knife No. 700a into the body.

d) Securely tighten the socket head screws No. 701a.

e) Securely tighten the screws No. 702a.

f) Release the socket head screws No. 701 a one full turn and retighten all 4 screws No. 702 a by giving them 1/2 of a turn to the right. This is necessary to prevent the knives from compressing and to maintain a shearing gap of from .004 to .012 of an inch. After this please check the play between the blocks by a feeler gauge which is supplied with the machine.

g) Tighten solidely the socket head screws No. 701 a.

h) Replace the mitre guide No. 820 and clamp into desired position by means of kip lever No. 823.

4. Cleaning the Type PMG Knives

Type PMG knives require very little maintenance. The space between the knives should be free from oil or grease to permit the scale to fall through. Remove and clean them at intervals depending upon the amount of mill scale encountered.

5. Sharpening the Blades of the Section Knife

Grind the five removable blades only on their cutting face side. If the knives are ground the wrong way and the cutting edges no longer converge at one point, poor cuts will result.

Regrind the blades only so long as the cutting corner fully passes the cutting edges of the stationary knife when the slide is in its bottom position, or else replace them with new ones. You will find the part numbers stamped on the knives in addition to appearing in this manual.

The corners of the blades which contact the root of the angles are shaped to cut most sections. For cutting angles having root fillets, the blades should be ground to the exact radii if no deformation whatsoever is wanted in the root.

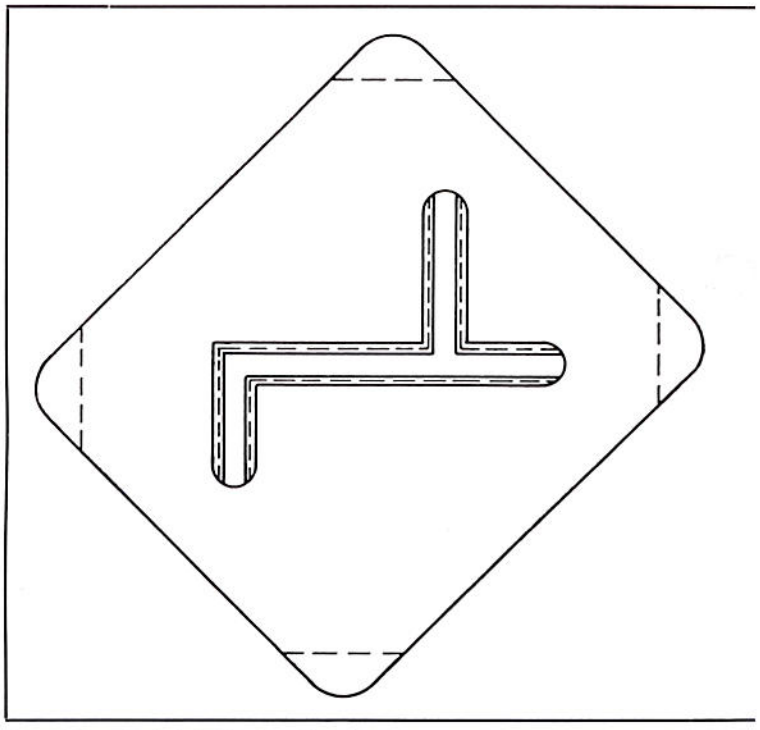


Fig. 78: Regrind the blades uniformly

6. Cutting with Type PMG Knives

a) Inserting the Sections

When cutting angles squarely and at any mitre angle, close the sliding blade No. 706a, fully, in the stationary section knife and open the sliding blade No. 716a entirely.

When cutting tee sections, place them into position in the knife and slide the two sliding blades up to the tee as closely as possible, yet not so tight as to prevent the feeding through of the stock. The closer the adjustment, the better the cut.

You will find instructions on the correct adjustment of the sliding blades and proper insertion of sections in the cutting directions below.

b) Hold-down and Section Stop

The mitre guide No. 820 on the mitre guide rail No. 827 can be set to square (90°) or mitre cuts up to 45° by means of the graduations on the rail. It is fixed in the desired position by means of the kip lever No. 823.

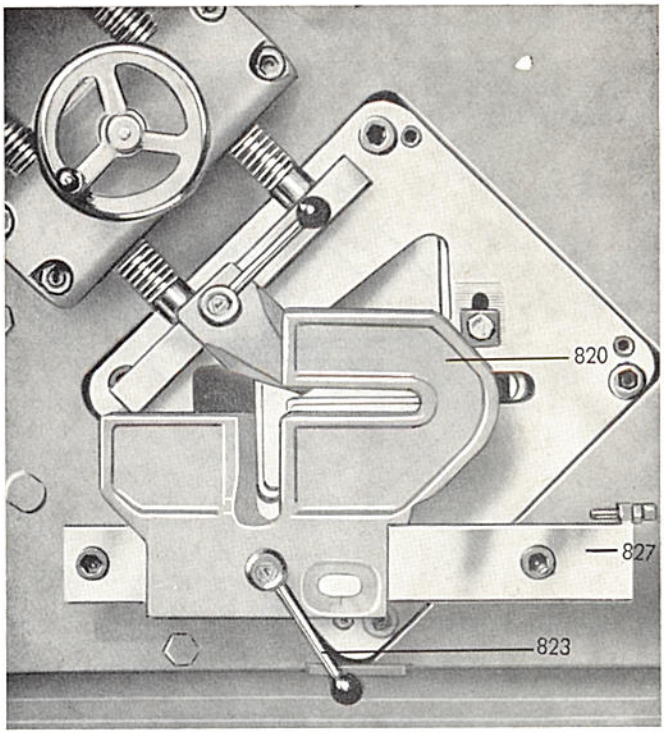


Fig. 79: Mitre guide for mitre cuts 45°

For square (90°) cuts there is a stop bolt No. 829 with a lock nut No. 830 at the right-hand side of mitre guide rail No. 827. Simply move the mitre guide against the stop bolt and you have the correct position of the work.

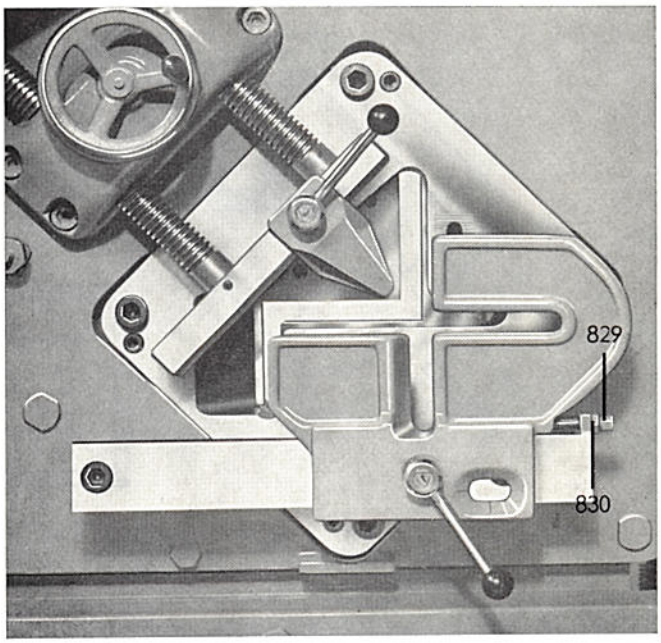


Fig. 80: Mitre guide for square (90°) cuts

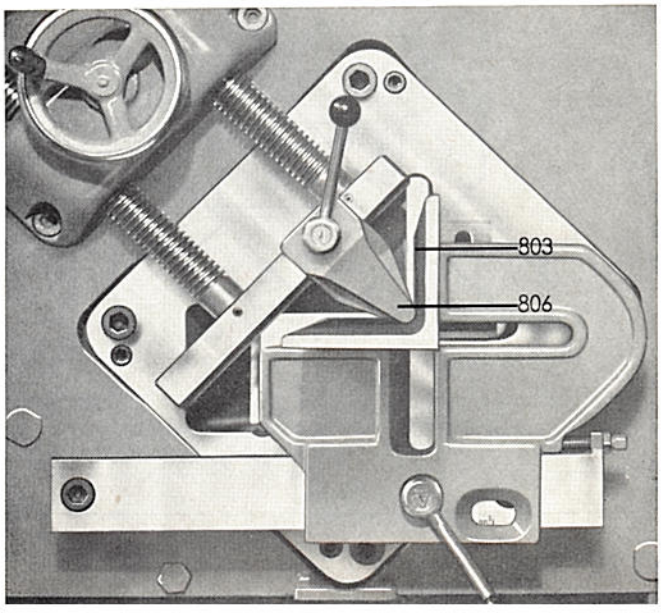
Fig. 81: Adjusting the double screw hold-down

The correct vertical position of the section is adjusted by means of the double-screw hold-down. When cutting in the right-hand knife opening, the work is held down by means of the clamping block No. 806. Move this on the hold-down bar in such a way as to make it hit the section root with its tip when the hold-down is lowered.

When cutting in the left-hand knife opening, slide the clamping block out of the way. The section is held down by means of the hold-down bar.

The vertical position is correctly adjusted if the section is in a horizontal position during cutting.

If the cut is not exactly perpendicular, make the necessary corrections for the vertical and horizontal legs by means of the hold-down and mitre guide respectively. When the section is in the correct horizontal position ready for shearing, it will be slightly above the mitre guide, not resting upon it. This is to allow for the continual feeding through of the stock without the necessity of loosening the hold-down after each cut.



Cutting Instruction section knives PMG