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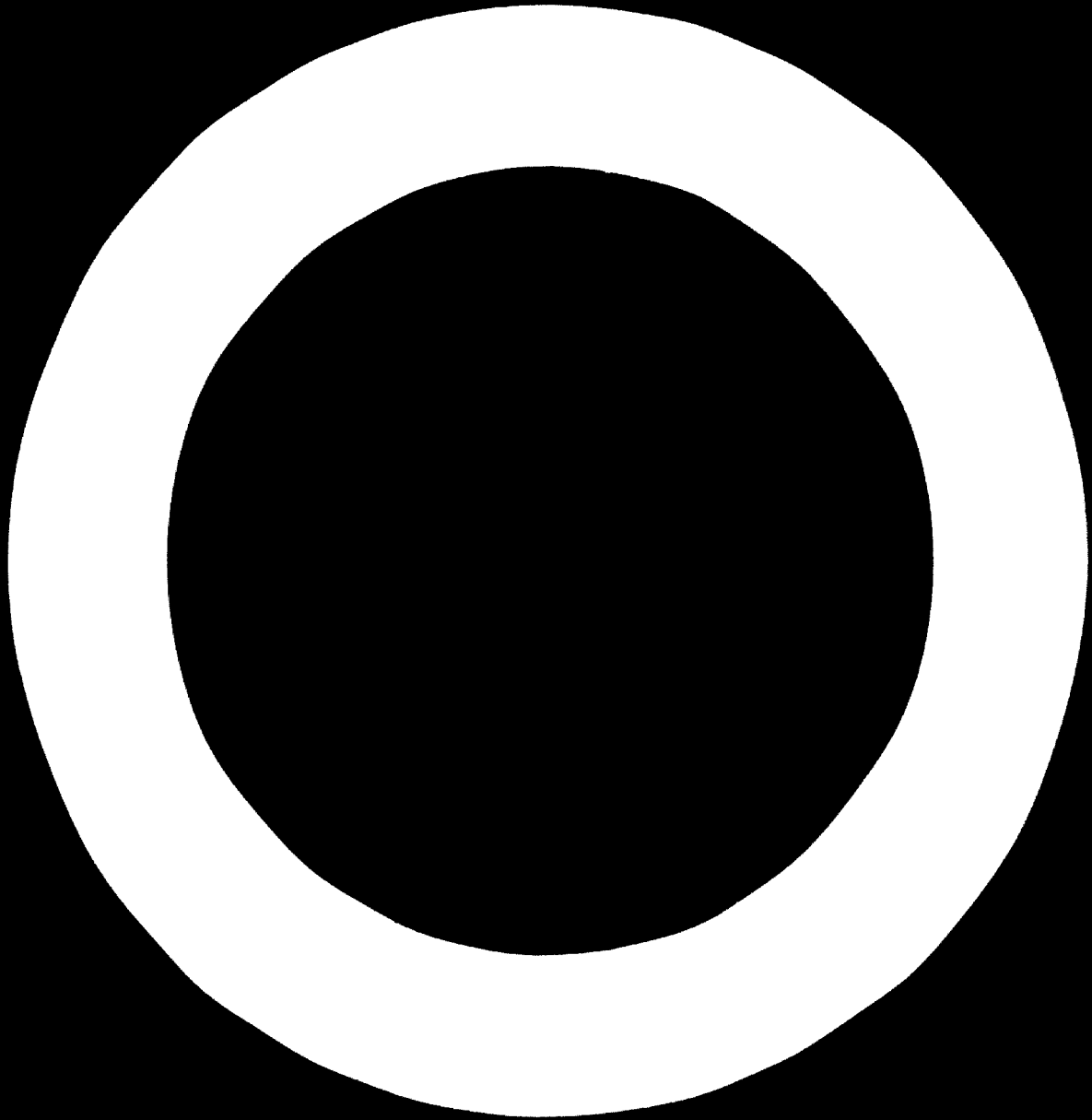
SHARPENING CARBIDE TIPPED TOOLS INTENDED FOR USE ✓  
IN WOOD- AND PLASTIC- WORKING

by  
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## Service of carbide tipped tools

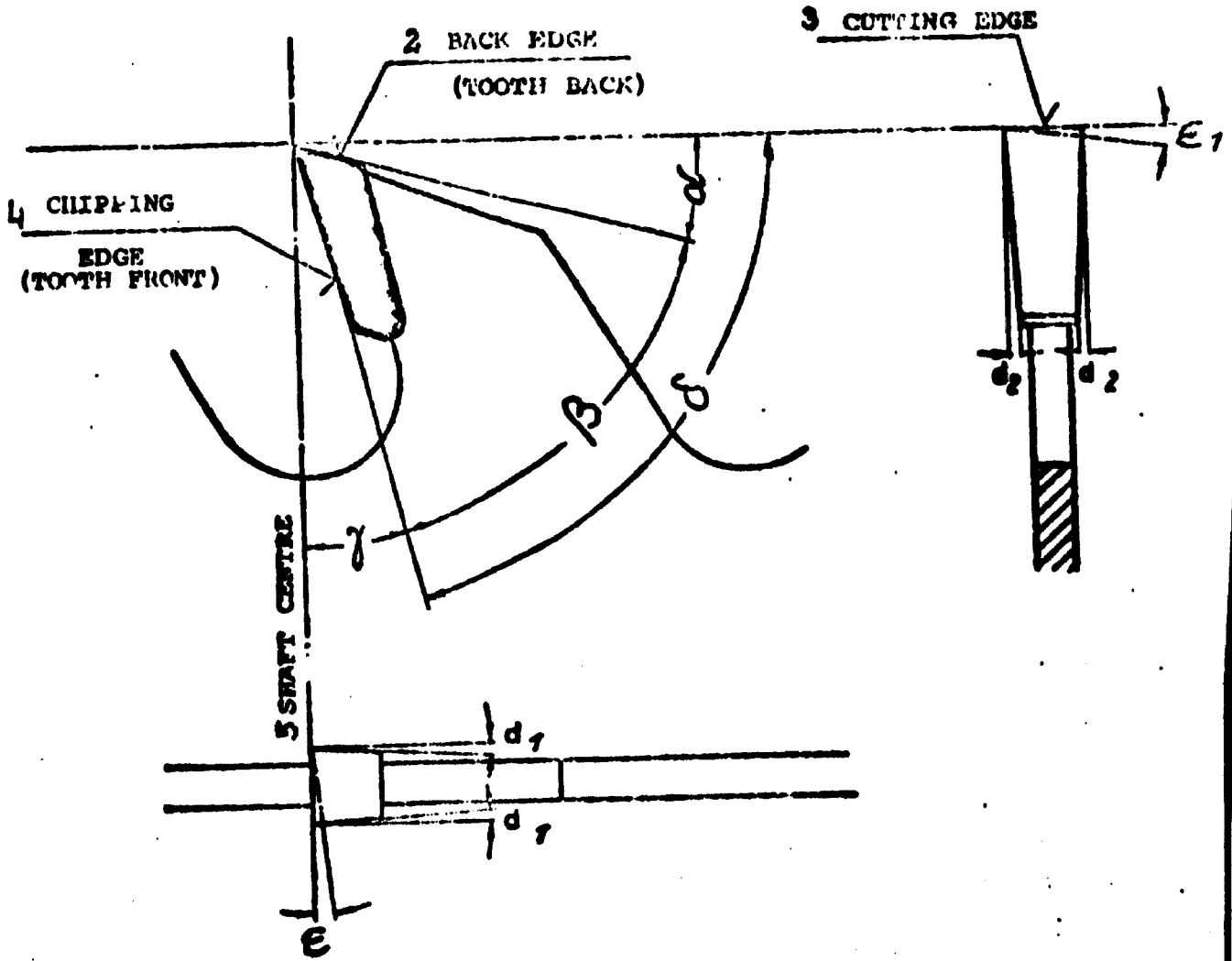
### Introduction and general instructions

Carbide is made by sintering. Tools tipped with carbide are easily damaged by impact and knocks. They must never be laid on machine tables or other metal surfaces but instead on bases made of wood, rubber or plastic. This is particularly important in transfer and storage. The condition of a carbide tipped tool must be constantly observed. When signs of wear occur, the tool must be serviced and repaired in time. If the worn area becomes too wide, the required force and energy demand increase unnecessarily, and the blades may break and cracks may develop in the body. Also, service becomes uneconomical, since the carbide and the diamond impregnated grinding wheel are worn rather fast. Before servicing carbide tipped tools, they must be carefully cleaned with resin remover or crystal soda solution. Steel brushes or hard and sharp metal objects must never be used.

If the blades are badly damaged, reconditioning them with new carbide tips should be considered for economical reasons instead of performing laborious repair. In all sharpening phases the sharpening ought to be performed towards the blade. Only small counter-pressure, i.e. small feed, should be used. At the beginning and end of each feed the grinding wheel must never be fed along the blade. Instead, it must be inserted or removed perpendicular to the blade. Otherwise the blade will bend. The original blade shape must be maintained if possible to keep the cutting capacity unchanged. After sharpening the carbide must be allowed to cool off gradually in the air. It must never be cooled suddenly, for it could cause splits or damage in the carbide. After every sharpening the blade must be checked to ensure that there are no splits in the blade, that it cuts well, has and maintains the correct shape and steady rotation.

Sharpening circular saw and grooving cutters

1 ANGLE DESIGNATIONS



- $\alpha$  - clearance angle
- $\alpha_1$  - tangential clearance angle
- $\alpha_2$  - radial clearance angle
- $\beta$  - tooth point angle
- $\gamma$  - chip angle
- $\delta$  - cutting angle =  $\alpha + \beta$
- $\epsilon$  - front bevel angle
- $\epsilon_1$  - back bevel angle

Sequence of work phases

1. Cleaning the saw blade
2. Inspection of the general condition
3. Circular grinding of the blade diameter
4. Sharpening of the chipping edge, if necessary
5. Coarse grinding of the back edge
6. Finishing of the back edge
7. Careful removal of excess from the tooth back edges of the saw blade

Circular grinding

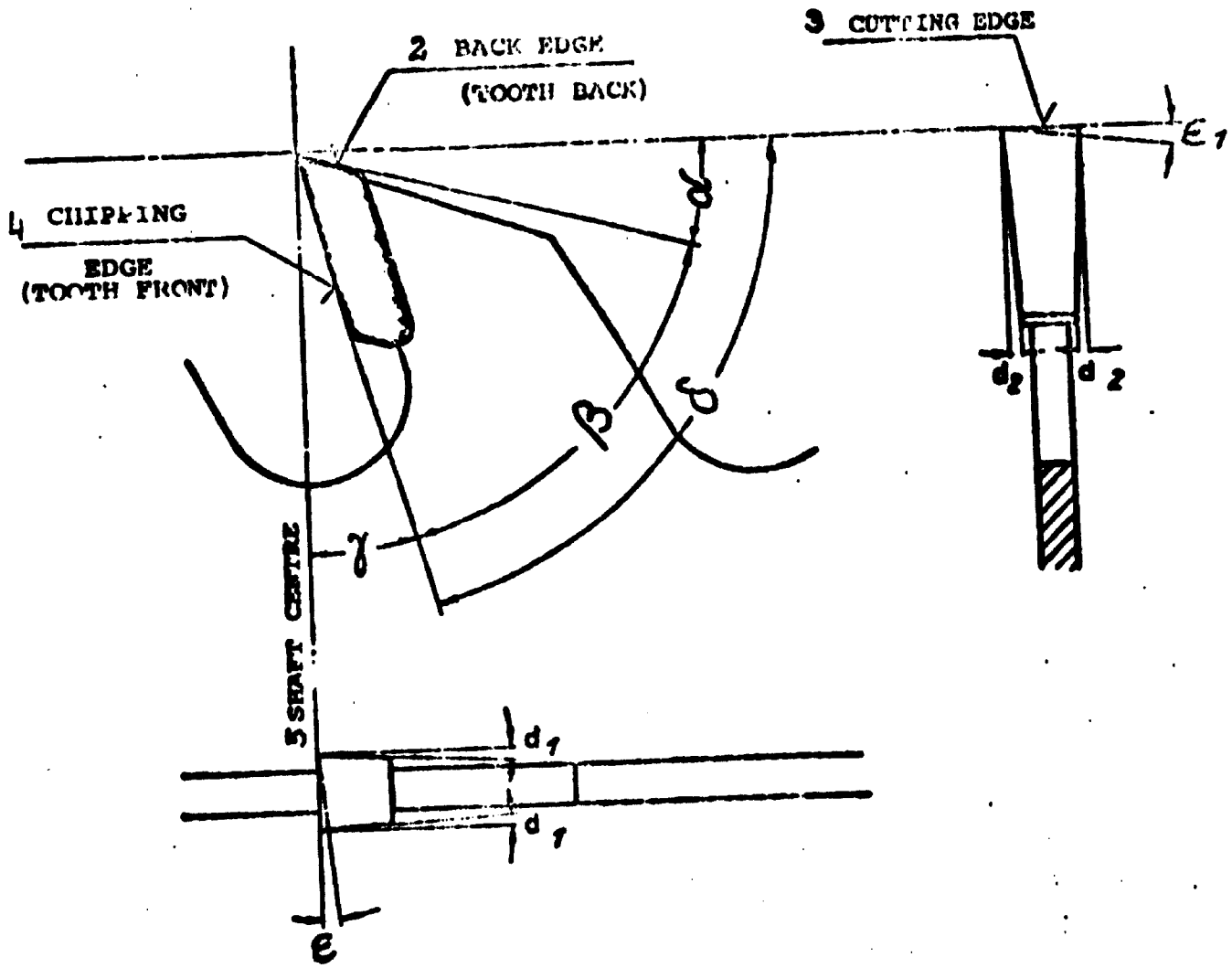
Diamond impregnated grinding wheel D 70/C60, when there are cracks in the blade or it is badly worn.

Diamond cup grinding wheel D 30/C60 for finishing circular grinding.

A carbide tipped saw blade, which has been mounted to a saw sharpening device, is rotated manually at the grinding wheel. The teeth must always be towards the cutting blade. The circular grinding bevel must be large enough so as not to leave any signs of wear. If the worn area is not extensive, the circular grinding is not necessary. Instead, the lowest tooth (cutting edge) can be found with a measuring device and all other teeth are sharpened in correspondence with it. If there are severe cracks in multi-tooth saws, the largest of these can be ignored provided that they are not immediately one after another. Thus unnecessary reduction of the diameter is avoided and the saw blade's life is not shortened. Carbide tips which have become useless must be replaced. This can be done in the manufacturing plant, in which case it is recommended to have the saw blade tensioning checked at the same time.

Sharpening circular saws and grooving cutters

4 ANGLE DESIGNATIONS



- $\alpha$  - clearance angle
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Sequence of work phases

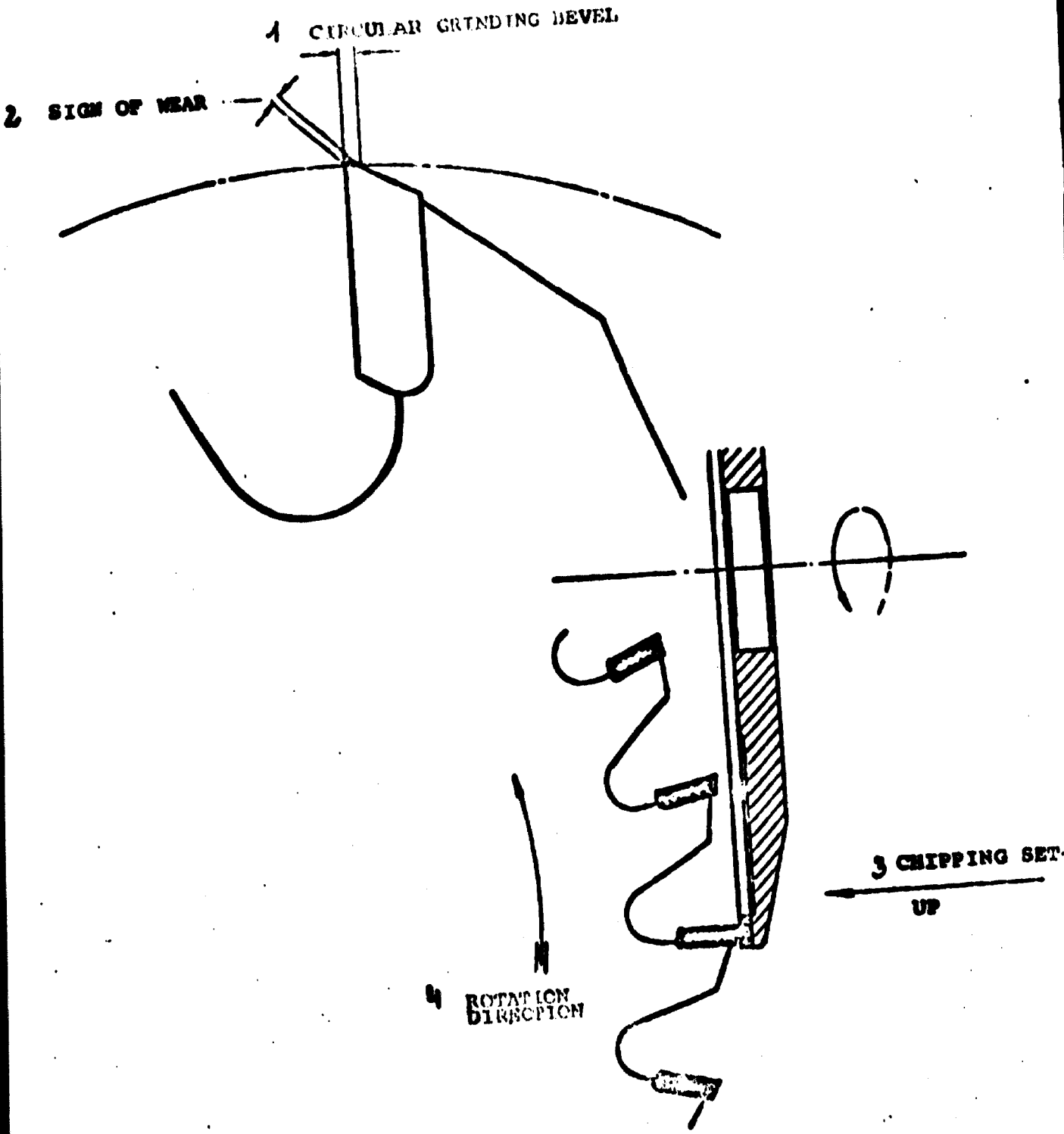
1. Cleaning the saw blade
2. Inspection of the general condition
3. Circular grinding of the blade diameter
4. Sharpening of the chipping edge, if necessary
5. Coarse grinding of the back edge
6. Finishing of the back edge
7. Careful removal of excess from the tooth back edges of the saw blade

Circular grinding

Diamond impregnated grinding wheel D 70/C50, when there are cracks in the blade or it is badly worn.

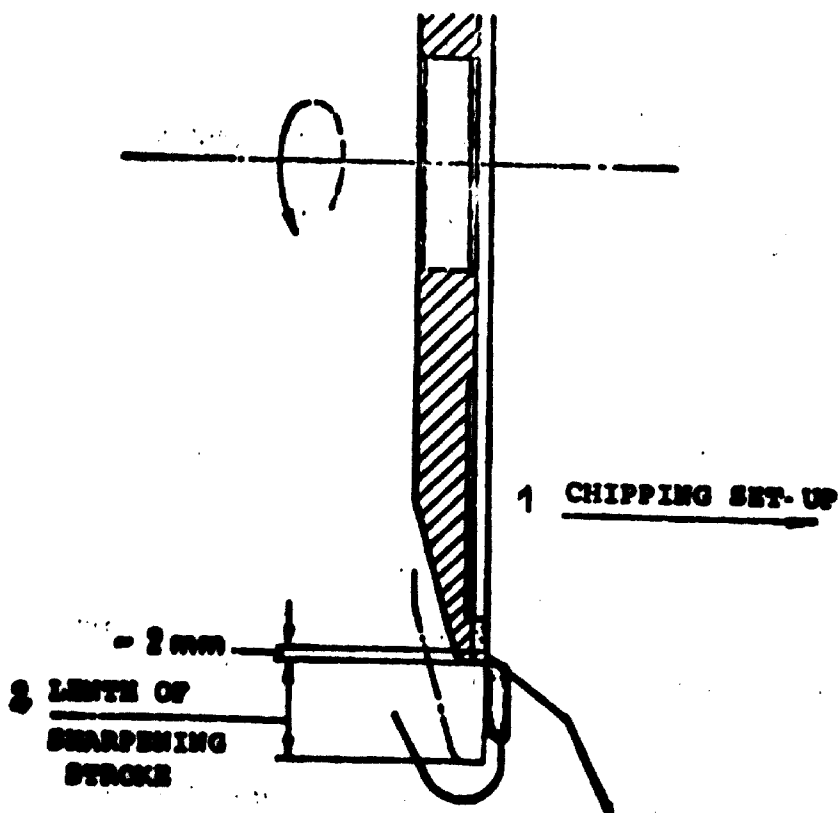
Diamond cup grinding wheel D 30/C50 for finishing circular grinding.

A carbide tipped saw blade, which has been mounted to a saw sharpening device, is rotated manually at the grinding wheel. The teeth must always be towards the cutting blade. The circular grinding bevel must be large enough so as not to leave any signs of wear. If the worn area is not extensive, the circular grinding is not necessary. Instead, the lowest tooth (cutting edge) can be found with a measuring device and all other teeth are sharpened in correspondence with it. If there are severe cracks in multi-tooth saws, the largest of these can be ignored provided that they are not immediately one after another. Thus unnecessary reduction of the diameter is avoided and the saw blade's life is not shortened. Carbide tips which have become useless must be replaced. This can be done in the manufacturing plant, in which case it is recommended to have the saw blade tensioning checked at the same time.



Sharpening the chipping edge (front grinding)

Diamond cup wheel D 70/C50.  
The carbide tipped circular saw mounted to a sharpening device is set to the machine so that the chipping edge is precisely aligned with the surface of the grinding wheel.



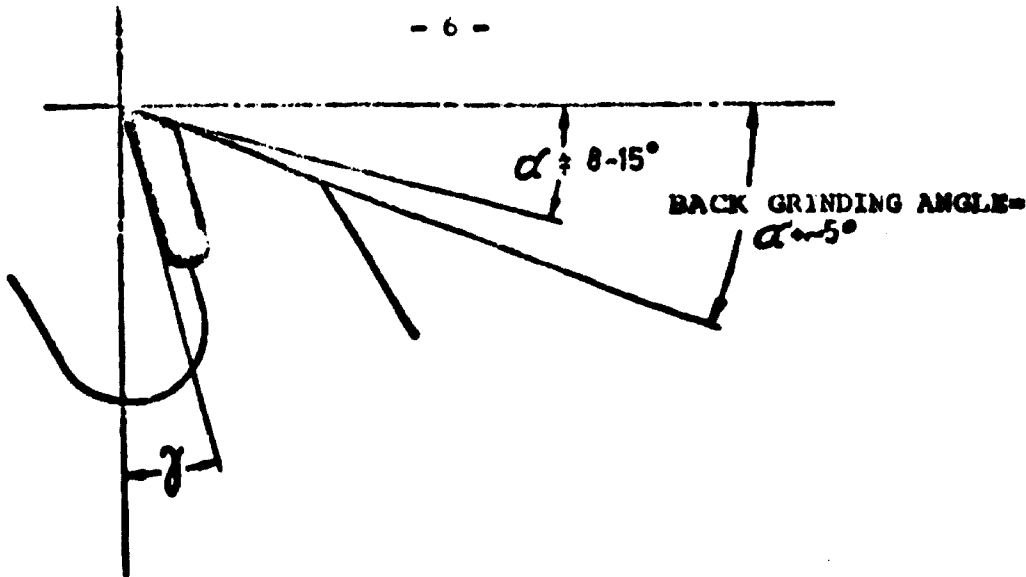
The chipping edge is ground lightly, and <sup>finished</sup> only if necessary. The carbide tip which is about four times longer than its thickness decides the maximum number of possible sharpenings of the chipping edge and back edge. Thus the number of the sharpenings of the chipping edge ought to be only  $\frac{1}{4}$  of the number of sharpenings needed for the back edge. To obtain steady rotation of the saw blade the chipping of all teeth must be even. If economical use of the diamond impregnated grinding wheel is desired, the maximum chipping set-up must not exceed  $\frac{2}{100}$  mm. When grinding, the cutting edge must not be crossed to prevent it from bending.

#### Grinding the back edge

Coarse grinding: diamond impregnated grinding wheel D70/C50.

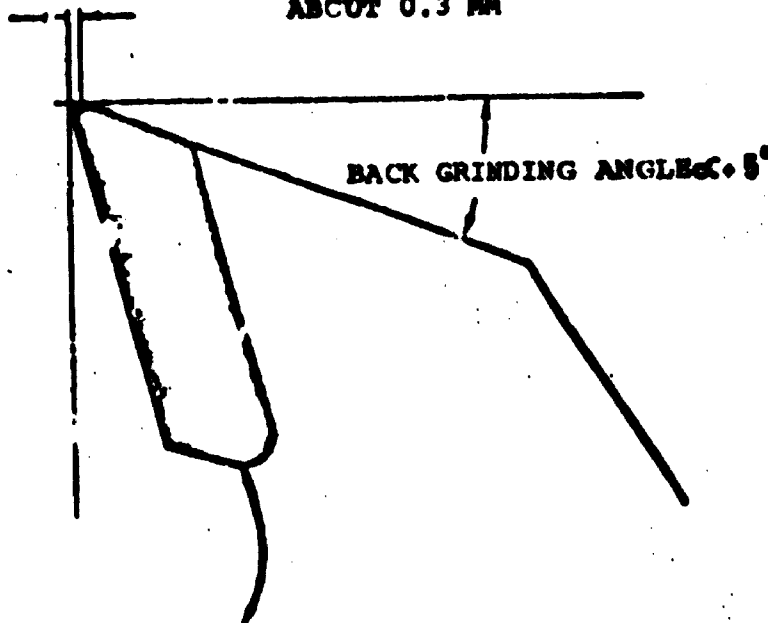
Finishing: diamond chip wheel D30/C50.

When sharpening the clearance angle, the diamond impregnation of the wheel must not touch the basic material of the saw blade. This is possible if the carbide tipped circular saw blade is directed so, that an approximately  $5^\circ$  wider back angle is obtained than the clearance angle at the carbide tip.



Coarse grinding is necessary only when <sup>after</sup> the last grinding of the clearance angle (there is a bevel larger than 1 mm in the basic material).

**CIRCULAR GRINDING BEVEL, THE REMAINDER AFTER COARSE GRINDING ABOUT 0.3 MM**



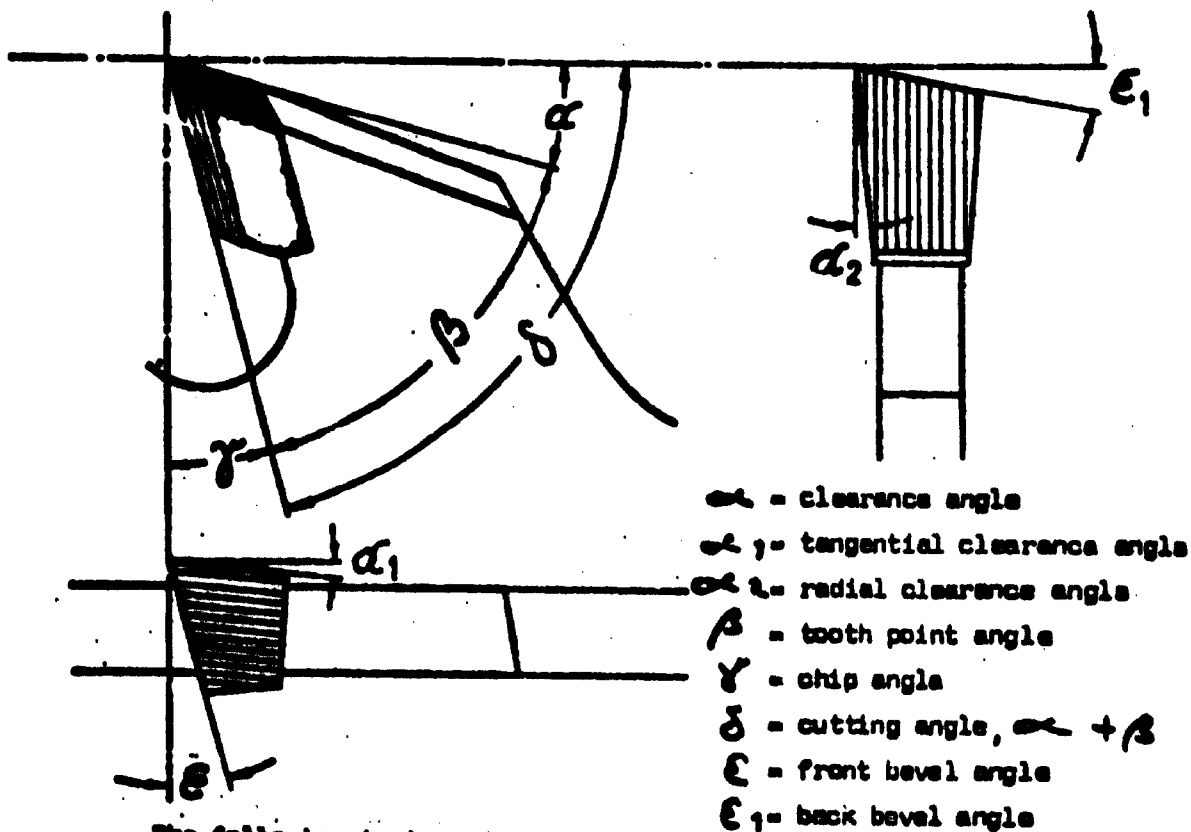
The back grinding angle must be about  $5^\circ$  larger than the desired clearance angle. In coarse grinding the remainder of the circular grinding bevel must be about  $3/10$  mm, so that when finishing the clearance angle only the carbide tip is sharpened with diamond impregnated wheel.

The finishing of clearance angle has a decisive effect on saw efficiency. It must be performed with particular reliability and care. The circular

sharpening bevel is ground all off, however not more than up to the cutting edge. Thus special attention must be paid to perfectly steady rotation.

When teeth with special shapes are concerned, such as trapeziform teeth, convex teeth, alternate front or back bevel teeth, mutually bevel teeth, alternate or mutual front and back bevel teeth, etc. the sharpening is performed in the same way. It is important to set up the angle exactly according to the manufacturer's instructions. If they are not available, it is recommended that the angles are measured using a new unused saw blade as a model.

### Grinding of cutters



The following instructions are applicable to all kinds of cutters:

Before grinding the cutter, it must be carefully cleaned and every cutting edge must be examined. If there are cracks in the carbide tips, they must be replaced to prevent accidents. Also carbide tips with breaks must be replaced.

When grinding, attention must always be paid to even and balanced chip removal. If this is not possible, due to large breaks, the cutter must be balanced again after the sharpening.

If the angles are not known, they must be defined so that proper set-up

can be made. After sharpening all cutting edges must be once more checked to find out eventual cracks.

#### Circular grinding:

Diamond impregnated grinding wheel D70/C50, when cracking of cutting edges or excessive wear are concerned.

Diamond cup wheel D30/C50 for finishing.

The cutter is fixed to the tightening device of its hole, if necessary with concentric plates, and set to the pitch controller.

Grinding must always be performed towards the cutting edge. Circular grinding is performed according to the cutting knife with largest signs of wear or cracking.

#### Grinding of the chipping edge

Diamond impregnated grinding wheel D70/C50 if coarse grinding is necessary.

Diamond cup wheel D30/C50 for finishing.

The cutter with its tightening device is fixed and set to the pitch controller. The pitch controller is turned according to the axial angle so that when the fixing carriage moves, the chipping edge touches the grinding wheel precisely.

#### Grinding the chipping devices

Since the chipping devices made by various manufacturers are often structurally different, it is recommended that the manufacturer's service instructions are observed.

The general sharpening instructions of carbide tipped circular saws can be applied also to them. They are generally applicable without restrictions as far as edging circular saws which can be detached from the chipping body are concerned, and partly in the case of tooth segments fixed to the chipping body.

Usually a special fixing device is needed for a detached edging saw blade and chipping body. The holes of detached edging saw blades are unusually large and the holes of the chipping body are generally flange-shaped.

In addition to grinding instructions of the manufacturer also the instructions given in "Sharpening of carbide tipped tools" should be observed.





**76.01.16**