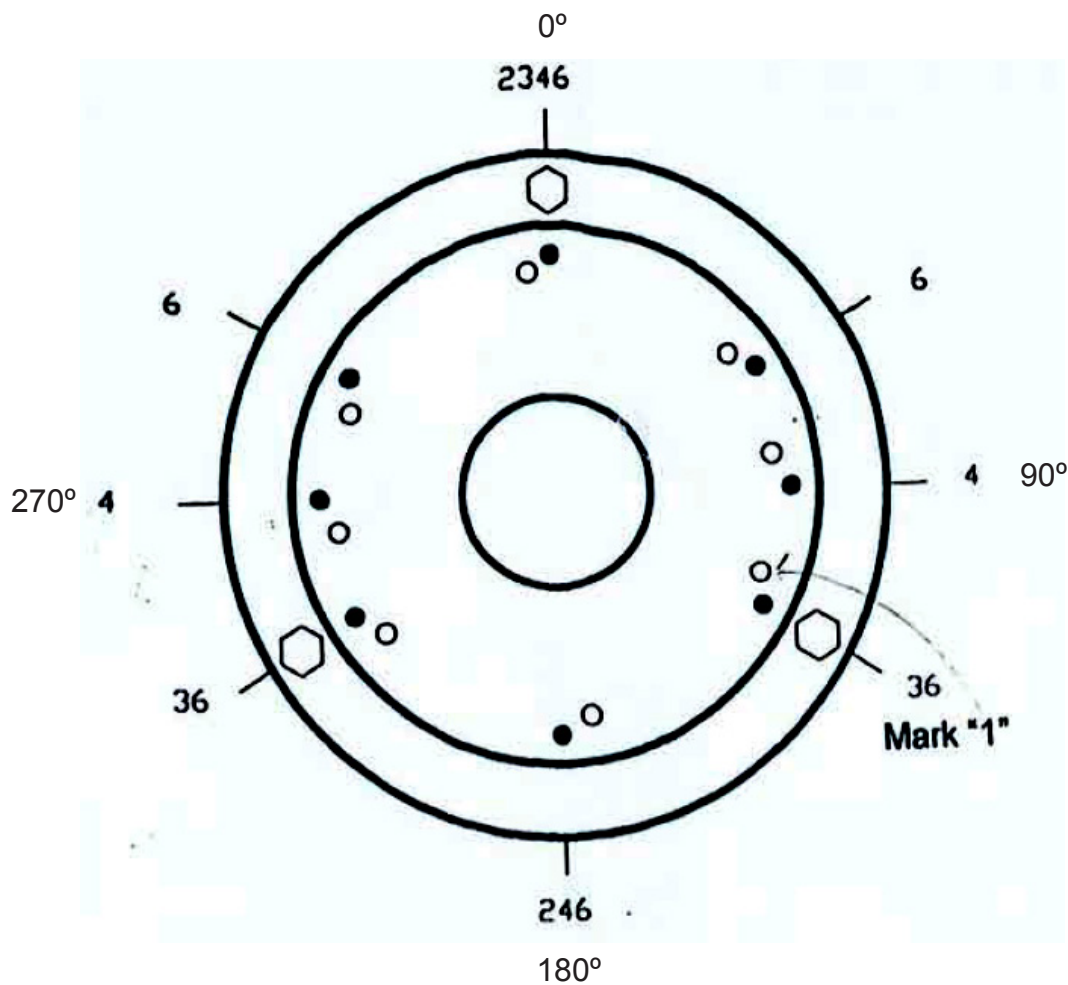


# **DRILL GRINDING ATTACHMENT**

To suit TM6025Q TOOL AND CUTTER GRINDER



## **OPERATION'S MANUAL**



**INTRODUCTION**

Before grinding any cutters, you must set up the attachment to suit the type of cutter or drill you want to sharpen.

The first thing to set is the cam pins (No.14), These are on found on the back of the chuck

The numbers on the above picture show you the position the cam pins (No.14) will need to be placed according to the number of flutes of the drill as outlined in the example below.

1. If you would like to grind a standard 2 flute drill, you must screw the cam pins (No.14) into the two positions marked with a "2"
2. If you would like to grind a tap with 3 flutes, you must screw the 3 cam pins (No.14) into the three positions that are marked with a "3".

In the above diagram there are two circles of holes an outer circle marked with "●" and inner circle marked with "○"

Mark "●"(outside) : Means this is the locations for the cam pins (No 14) to be placed for grinding drills, step drills, and Taps.

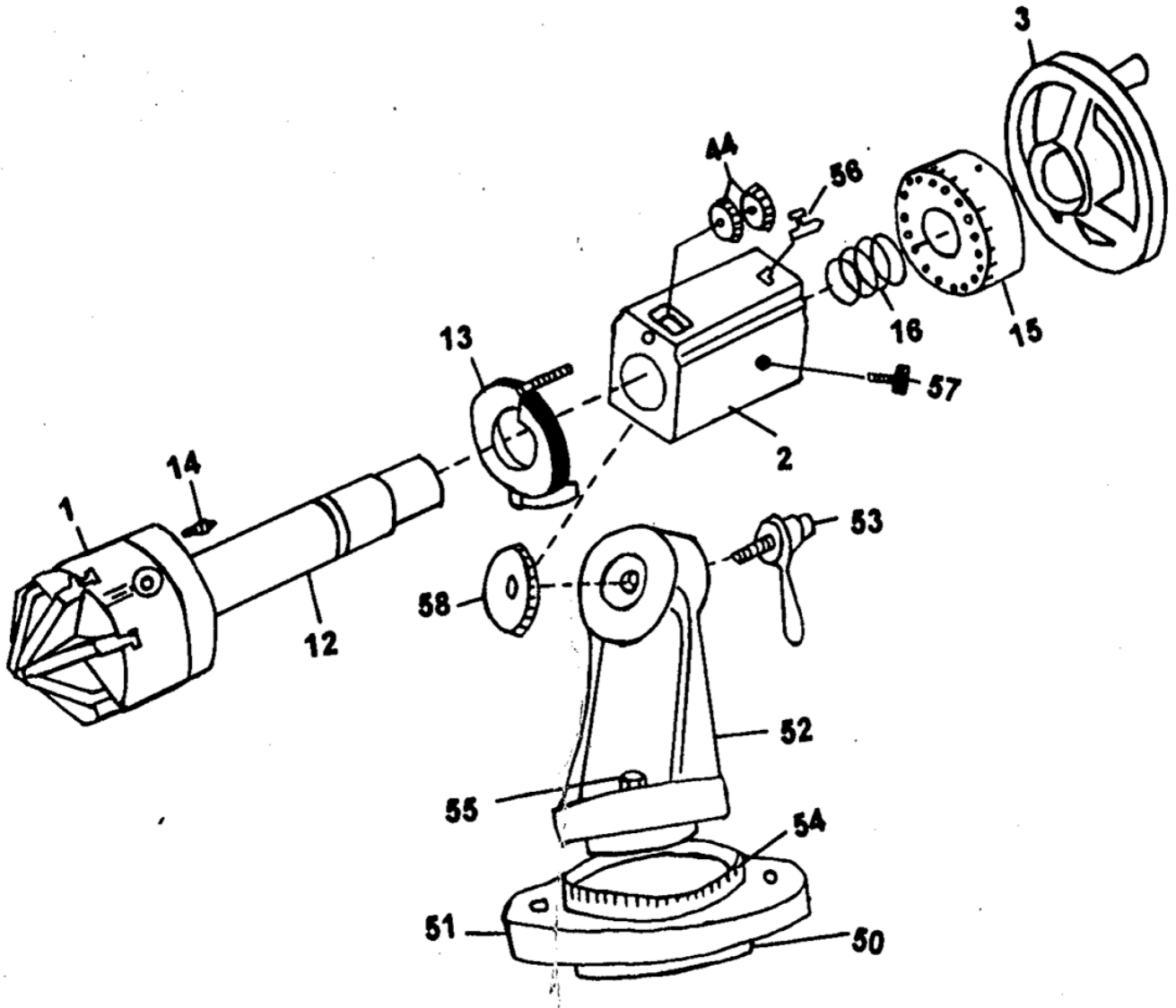
Marls "○"(inside) ; Means these are the locations for the cam pins (No 14) in for grinding counter sink drills.

Mark "1" is for grinding the single flute counter sink drills,

## Parts List

### DRILLS & CUTTERS GRINDING ATTACHMENT

No.	Ser. No.	Description	Q'ty	Specification	Remarks
1	K003	6-jaw Chuck	1	4"	
2	K001	Main	1		
3	K002	Handwheel	1		
12	K004	Chuck Shaft	1		
13	K005	Double Cams	1 set		
14	K014	Grinding needles	6		
15	K013	Diving Head	1		
16	K011	Spring	1		
44	K009	Adjusting Nuts	2		
50	P007	Key	1		
51	P001	Base Dish	1		
52	P002/P003	Main Column	1		
53	T014	Handle	1	M12*45L	
54	P005	Graduated Dial	1		
55		Hexagon Nut	1	M12*55L	
56	K010	Fixed Set	1		
57	K008	Screw	1		
58	P006	Graduated Dial	1		



**DRILL GRINDING.**

**1. SETTING UP THE ATTACHMENT**

It is important that the attachment is set up correctly on the machine before any operations are attempted. The Drill grinding attachment should be placed on the table of the machine and be lined up accurately with the center line of the grinding wheel.

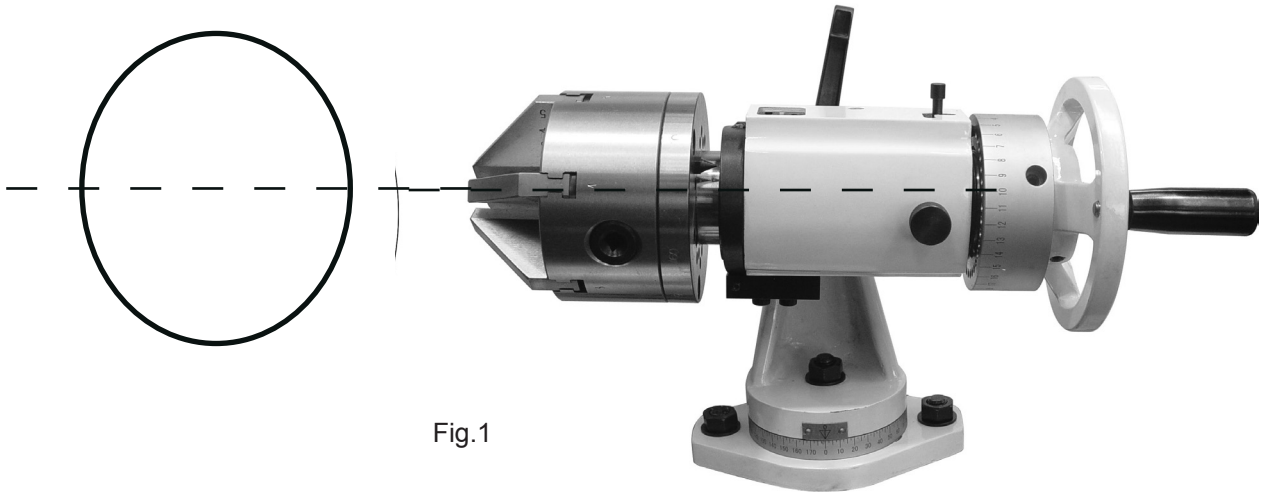


Fig.1

**1. GRINDING PREPARATION:**

If the drill is badly damaged it may be wise to first, grind the rear bevel of the drill, This can make grinding process faster and reduces the chance of excessive heat being applied to the cutting edge . This will ensure that there is no effect to the hardness and the metal characteristic of the drill. (see the following figure)

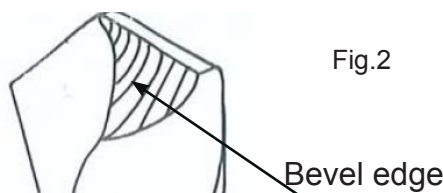
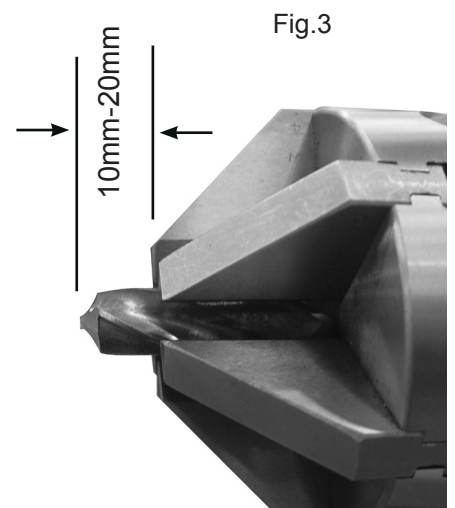


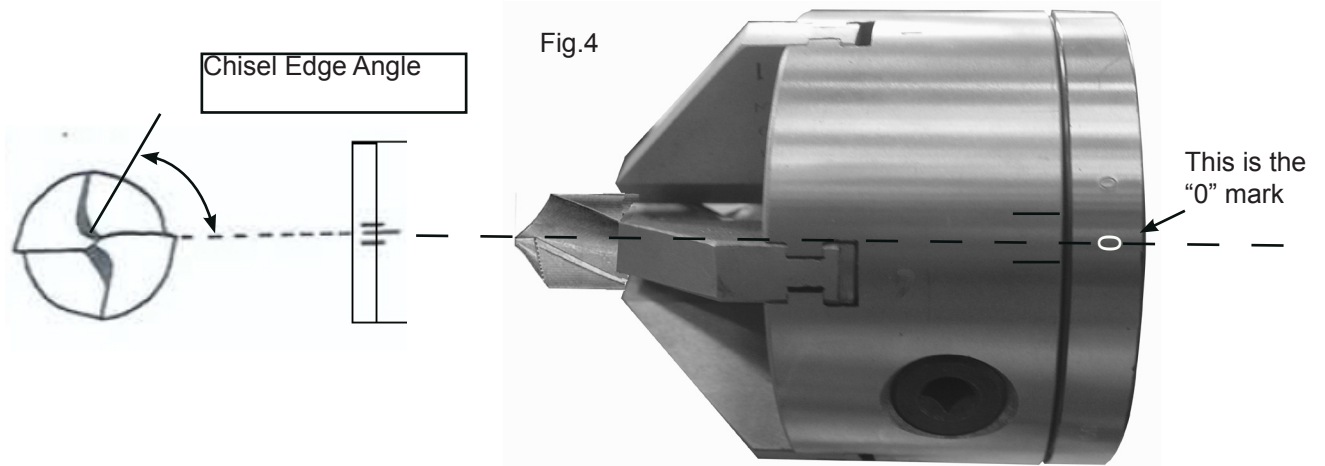
Fig.2

**A. SETTING THE DRILL**

1.. Insert the drill into the chuck (No.1 ) If the drill is over 6mm it should protrude 20mm out from the jaws of the chuck. If the drill is under 6mm, then it should protrude only 10mm out of chuck.



2. To insure that the cam action is align with the cutting edge of the drill, the drill need to be clamped in the chuck (No1) so that the cutting edge is lined up between the two line marked on the chuck(No.1) These lines may be faint but can be found by looking for a "0" on the back plate of the chuck (see the following figure) Once in position then, lock the chuck tightly with the screw (No.57)



**B. SET THE CUTTING POINT ANGLE**

The cutting point angle of the drill needs to be selected. The cutting point angle is usually referred to as an included angle. There are three drill point angles widely used. 118° angle is used for general purpose drilling of metal. 135° is used for harder steels and stainless steel. 114° is used for wood and plastics.

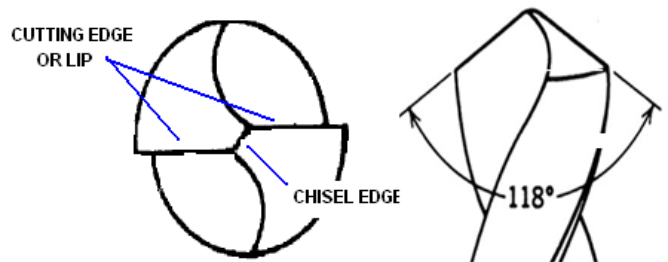


Fig.5

To set the cutting point angle make sure that the attachment is located in the table slot. Undo the nut (No55) and set the desired angle on the scale (No.54). When you have set the angle then tighten the nut (No.55)

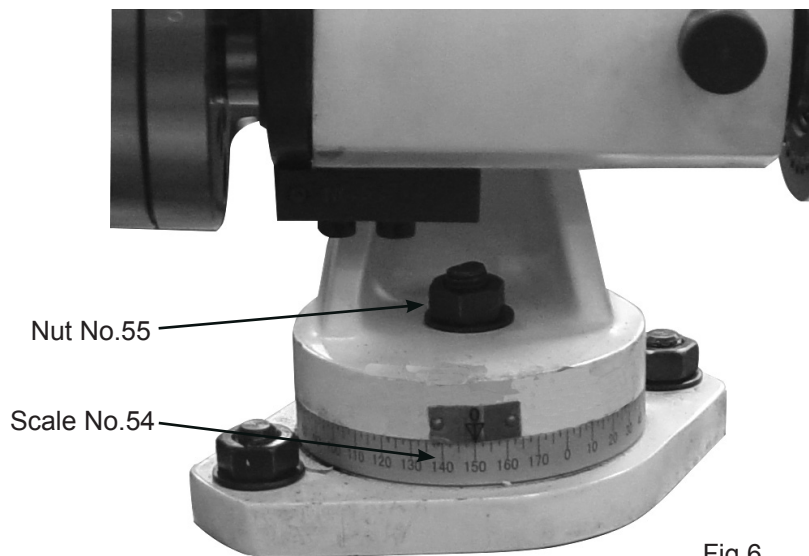


Fig.6

**C. SET THE RELIEF ANGLE OF CUTTING POINT (ADJUST LIP CLEARANCE ANGLE)**

The relief angle or Lip Clearance, is controlled by the amount of angle given to the cam. (No.13)  
The cam is adjustable at one end and is pivoted at the other end. This allows for the cam movement to be varied according to the relief angle desired.

There are two Knurled Lock Nuts (No.44), which can make the cam (No.13) to move back and forward. The more the Cam (No13) moves forward, the larger the lip clearance will be and the more the Cam (No.13) moves backward, the smaller the Lip clearance or relief will be.

1. Set the amount of cam movement (No13) by adjusting the knurled lock nuts (No44) to set the relief angle. This function is not graduated but more cam movement means more relief.

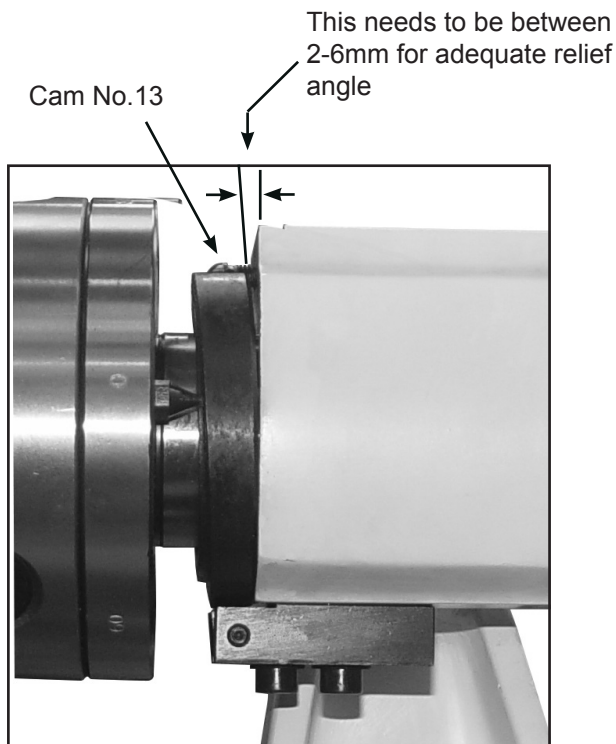


Fig.7

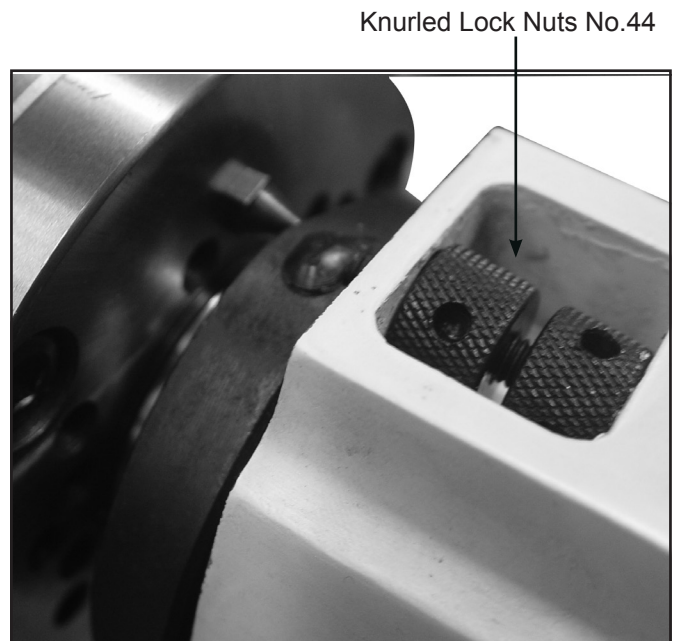


Fig.8

**D. ADJUSTING THE SPINDLE FLOAT**

The knurled knob (No.57) can be used to lock the spindle or can be adjusted to allow the spindle to float. By adjusting this knob the amount of spindle end float or the distance it can float can be limited. It should be set so that the cam pins and cam can interact easily. It should not allow the spindle to float more than is require for the cam and cam pins to interact easily.



Fig.9

**E. PREPARE FOR GRINDING**

Move the attachment so that the drill is in the suitable position to the surface of the grinding wheel.(Fig.10)

1. Turn on the power, and revolve the hand-wheel (No.3) slowly with one hand. Do not put lateral pressure on the spindle, but allow the spring (No.16) on the spindle to hold the cam pins against the cam.
2. Keep rotating the hand wheel (No.3) when the grinding wheel starts and gradually feed the drill towards the wheel until grinding takes place.

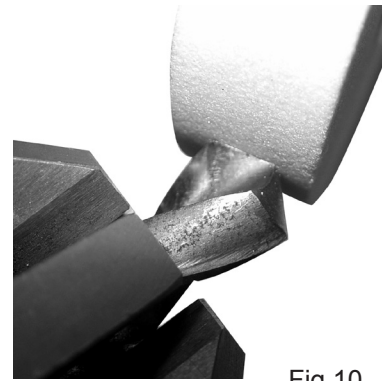


Fig.10

**F. GRINDING THE CUTTING EDGE RELIEF ANGLE**

The cutting edge is also known as the “LIP” (Fig.11)

The lip relief angle measures the clearance behind the cutting lip. Move the drill to a suitable position to the surface of the grinding wheel.

1. Turn on the power, and revolve the hand-wheel (No.3) slowly with one hand and with the other hand, slowly feed the drill into the wheel making sure that no lateral pressure is placed on the spindle, so that the spring (No.16) on the spindle holds the cam pins against the cam.
2. Continue until both sides of the drill have been restored to the original state. Be-careful not to overheat the drill

Lip or cutting edge relief angle

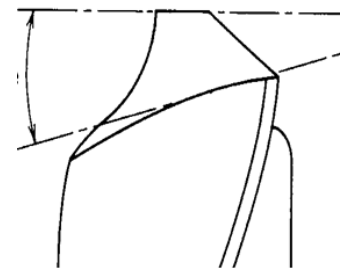


Fig.11

**G. SHARPENING THE CUTTING EDGE**

In most cases the above operation will be sufficient, but for production use the second clearance angle may be needed. This is shown by the distance between “A” and “B” (Fig.12)

- 1, Loosen Handle (No.53) a little. Then adjust the angle of the fixture, by raising about 10—15° or the angle required. (Fig.13)
2. Now insert the de-tent pin (No.56) into the hole on the cylinder (No.16) at the rear of the shaft. The drill must be now set using a height gauge so that the cutting edge is horizontal with the table and in line with the center line of the wheel..
3. There are two series of matching graduations with holes around the outside in the cylinder. If the drill has two-fluted edges, you must find the equal positions of the opposite sides of the cylinder. For example, if you adjust the position to the “6” on one side, then you must rotate the cylinder to the other “6” of the other side. This will grind each side evenly and grind the cutting edge the same on both flutes, (Fig.14)
3. Take a light cut across the wheel by using the cross feed screw then rotate the cylinder and place the indent pin in the opposing number and repeat a light cut. Repeat the process until there is a small flat across the cutting edge.
- 4, When the grinding procedure has been done or the angle needs to be changed, move the drill away from the grinding wheel. This is to avoid the Chuck (No.1) from touching the grinding wheel while No.53 lever is loosened.

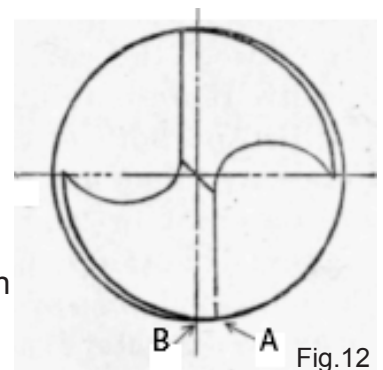


Fig.12



Fig.13

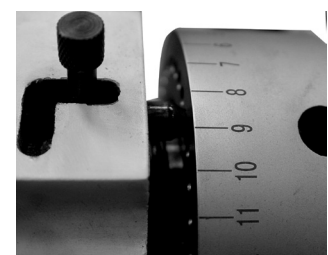


Fig.14



**G. SHARPENING A BRAD POINT DRILL (Clearance angle)**

Set up the attachment as in A, B, C

1. Loosen No.55 and align No. 52 about the line of 90°.
2. Loosen No.53, raise the chuck (No.1) about 12°
3. Lock the drill into the chuck (No.1), making sure you have aligned the drill correctly between the faint lines on the chuck.
4. Loosen the knurled nut (No.57) to allow the shaft to rotate but at the same time not allowing the shaft to float more than is needed to operate the cam pins No.14 against the cam No.13 correctly.
5. While turning the hand-wheel (No.3) move the drill in towards the wheel. Set the drill to aim for the external diameter and the back of the grinding wheel. Start to grind by rotating the hand-wheel (No.3.) Make sure the center point is not damaged. (Fig.15)

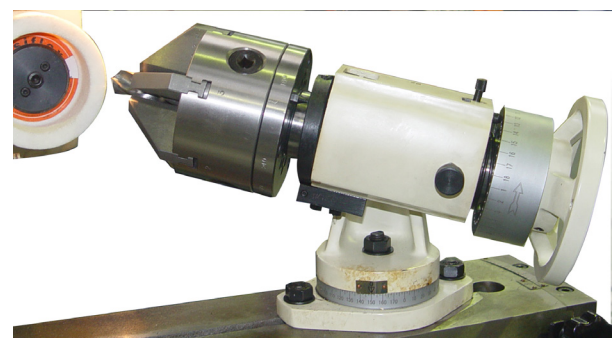
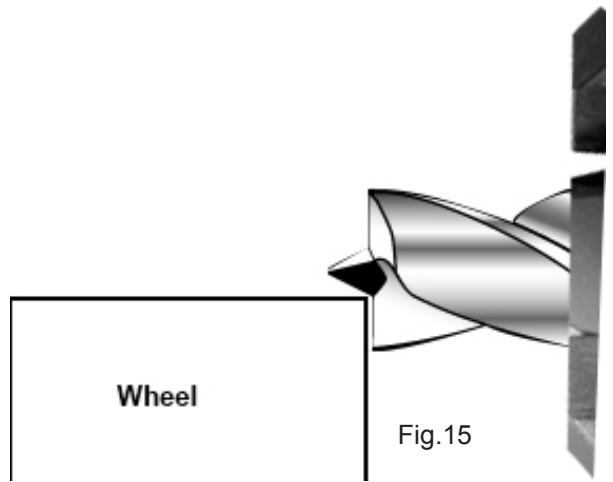


Fig.16

**H. SHARPENING THE CUTTING EDGE**

1. Line up the drill cutting edge parallel to the table and Insert the die-tent pin (No.57) into the hole on the cylinder (No.15)
3. Loosen handle (No.53) and raise the chuck (No.1) about 12°.
5. Use the longitudinal feed of the grinding wheel and the cross feed of the slide rest to control the feeding of sharpening the cutting edge. After taking a light cut, change to the opposite number of (No.15) and grind it again until there is a small flat on the cutting edge. Form the wheel to suit the profile desired. (Fig.17)

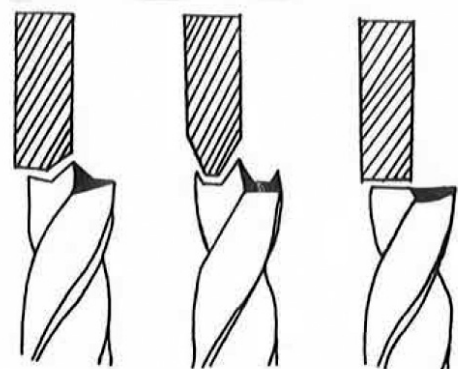


Fig.17

**H. SHARPENING THE CENTRE POINT**

1. Line up the drill cutting edge parallel to the table and Insert the die-tent pin (No.57) into the hole on the cylinder
3. Loosen handle (No.53) and raise the chuck (No.1) about 12°.
5. Use the longitudinal feed of the grinding wheel and the cross feed of the slide rest to control the feeding of sharpening the cutting edge. After taking a light cut, change to the opposite number on the cylinder (No.16) and grind it again until there is a small flat on the cutting edge. (Fig.18)

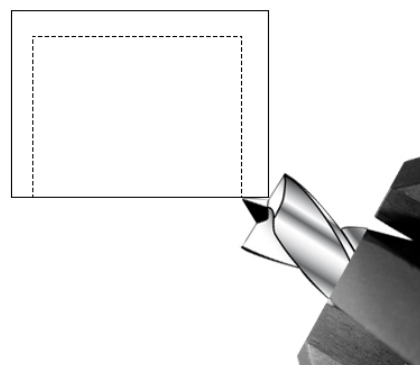


Fig.18

**J. GRINDING STEP DRILLS**

**1. Grinding the step.**

- a. Lock No.57 into No.12 to allow the shaft to rotate. No.13 does not rotate with the shaft.
- b. Push No.12 forward about 10mm, until half of the screw No.57 sits in the groove in No.12. This allows the spindle No.12 to turn freely so the step diameter can be ground to size.

(Fig.19)

3.If a second cutting edge has to be ground as the first layer, the chuck No.1 must be fitted with Cam pins No.14 (two pieces). It is important to align the second cutting edge. After that, you can finish step drill grinding.

4. Please see the following figure for reference. (Fig.20)



Fig.19



Fig.20

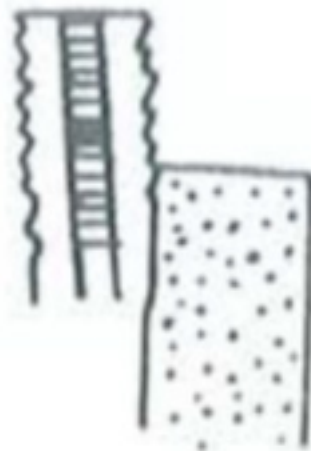


Fig.21

**TAP GRINDING**

Taps can be found with 2 flutes, three-fluted edge, four-fluted edge, five-fluted edge and six-fluted edge.

2. If equip with three-fluted edge tap, then the cam pins need to be changed to another set of No.14 Cam pins (3 pieces) and insert them into holes marked as “3” in the No.1 chuck. Then, you can grind the three-fluted edge tap as per “F”.

3. If equip with four-fluted edge tap, then the cam pins need to be changed to another set of No.14 Cam pins (4 pieces) and insert them into holes marked as “4” in the No.1 chuck. . Then, you can grind the four-fluted edge tap.

4. Use the same way to grind five-fluted and six-fluted edge.

5. Make the forepart of tap feed into the proper position at the surface of grinding wheel.

(see Fig.21)

G, Revolve No.3 slowly by one hand when the grinding wheel starts (remember do not pause), and then do the feed by the other hand . Keep feeding until the tap touches the grinding wheel and make sparks,

**END MILL LIP GRINDING**

1. Turn off the grinding machine and loosen No.53 a little, and move the head to the angle you need for grinding the lip relief angle.
2. Place the de-tent pin No.56 in one of the holes in the cylinder No.16 at the rear of the shaft. These are used to control the positions of the cutting edges. Set up the cutter with a height gauge so that the cutting edge or lip is parallel to the table. Then clamp the cutter.
  - . There are a series of numbers between 0° and 180°. The same series of numbers are in 180° - 360°. If the end mill has two-flutes, you must find the equal positions in the opposite range. For example, if you have the die-tent pin in position “6” on one side, then you must rotate the cylinder No.16 to the position “6” on the opposite side. This method insures each lip is correctly ground with the edges being the same height.
3. When the grinding procedure has been done, then the angle: needs to be changed, the cutting edge has to moved so that it clears the grinding wheel. This is to avoid No.1 chuck touching the grinding wheel while No.63 lever was loosened.
4. If you grind the end mill with three-fluted edge, you should divide the holes on the cylinder No.16 into three equal partitions.
5. If you grind the end mill with four-fluted edge, you should divide No.16 Into four equal parti-tions.
6. The cutting edge of the end mill has two angles.(Fig.22) The angles are the primary angle, and the secondary angle. A third process is the central gash point. The angles can be changed when-ever you need by loosening No.53.
7. If the cutter can plunge cut, the only other process may be to relieve the gash width. A center cut cutter is one where one side of the cutter has its cutting edge to the center with clearance between the remaining cutting edges. See Fig. 23. This clearance needs to be main-tained

