

OPERATING MANUAL FOR THE BURCO GRINDER  
U.S. PATENT #3,863,396

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A. DESCRIPTION:

1. What will the BURCO Grinder do?

It will sharpen moil points and chisels (hereinafter referred to as "tool steels") semi-automatically and will preserve their temper.

2. How is the temper preserved?

By keeping the pressure between the tool steel and the grinding wheel at an adjustable, constant, low level, which in turn maintains the temperature of the tool steel at a constant low level. This insures that the tool steel will not be overheated.

In addition, the tool steel is automatically moved back and forth over the rotating horizontal face of the grinding wheel, which significantly contributes to heat dissipation.

3. How can the pressure be adjusted?

Four tool steels are mounted on the grinder. They are supported at their shank ends by the tool holder. At the point ends, the tool steels rest on the rotating grinding wheel and are pressed against it by their own weight. To increase the pressure, weights are placed above the points. To decrease the pressure, the weights are removed.

4. Why increase or decrease the pressure?

The higher the adjusted pressure, the faster the tool steels will be ground. BUT: the pressure must NOT be increased to a level where it will cause discoloration of the tool steels.

A light discoloration of the tool steel (yellow) indicates that it has been slightly overheated and that its temper has been impaired.

A strong discoloration (blue) indicates that its temper has been ruined.

Note: An overheating will never occur if weights are not used at all. Therefore, if time is of no consequence, use no weights. You do not need them for the sharpening process. The weight of the tool steel is sufficient for safe and efficient grinding. This is especially so if the tool steel is long, because then its weight is the greatest. As the tool becomes shorter through frequent sharpening, its weight and the pressure against the grinding

wheel will be reduced. To compensate for that, weights can be added.

5. What happens if you forget to switch off the grinder while tool steels are being sharpened?

Nothing. After the grinding of the tool steels to the adjusted level has been completed, the grinding stone keeps rotating, the tool steels keep moving back and forth, but no sparks fly and no more metal is being removed. The point ends of the tool steels are now supported by a cradle which keeps the tool steels and the grinding wheel apart. Therefore: The operator can load the grinder with tool steels, switch it on and walk away from it. He can return at any time and check the progress of the grinding, or turn the tool steels 90° if the grinding of one side has been completed.

6. How long does it take to grind a moil point?

On average, it will take 80 minutes to sharpen four 18 inch-1½ hex moil points which have been considerably dulled by usage. Because chisels have only two sides to grind, the sharpening of four chisels will, on average, take half that time.

These times will be significantly shortened if the points of the tool steels are never allowed to become completely dull. This preserves their basic shape; only sharpening will be necessary. A severely dulled point must first be ground "back to shape" before it can be sharpened.

7. How can a skilled operator sharpen the greatest number of tool steels within a given time?

By adding and removing weights with this in mind:

- a. A dull tool steel rests on the grinding wheel with only a small area. Little material will be removed as long as this is the case. Consequently, a small amount of heat is generated and it is easily dissipated through the large cross section of the tool steel: Weights can be added.
- b. As the point is ground to a longer and finer tip, more metal is being removed, more heat is generated, and the small cross section of the tool steel tip restricts heat dissipation. A fine tip can easily be overheated:

Weights must be removed.

So, as a general rule:

1. Add weights in the beginning of the grinding when the steel is dull.
2. Remove weights as the sharpened point becomes finer and longer.
3. The shorter -- and therefore lighter -- the tool steel is, the longer the weights can be left on, or the more weight can be added.

Experience will teach the operator the most efficient timing.

8. What electrical current outlet do you need?

You need a grounded, 120 volt, single phase, AC receptacle.

9. What is the electrical equipment of the grinder?

The grinder operates with single phase, 120 volt, 60 Hz AC. (Grinders for 50 Hz frequency and 220 volts are available upon request).

Motor:

The grinding wheel is powered by a 3/4 HP electric motor. A separate special gear motor operates the tool steel transport. The total current drawn by the BURCO Grinder under full load is approximately 11.5 amps at 125 volts. See also enclosed "Installation Instructions and Parts List" of the Motor manufacturer.

Switch:

The grinder is equipped with a 30 amp indoor safety switch, which is both U.L. listed and C.S.A. approved (see figs. 1 and 2). This switch switches the grinder on and off. No other switch is on the grinder. See also enclosed "Installation Instructions and Parts List" of the Switch manufacturer.

Fuses:

Incorporated in the switch are two fuses protecting the electric motors from overloading:

- a 2.5-amp fuse for the transport gear motor
- a 20-amp fuse (time delay type) for the grinding wheel motor

Note: The electric circuit is designed in such a way that, should the grinding wheel motor be overloaded and its fuse blow, the tool transport motor will also stop.

B. RECEIVING:

When receiving the grinder, immediately report damages to the carton or to the contents to the carrier. It is your responsibility to file a claim for damages.

Specifically:

1. Check for damaged or bent tool transport components.
2. Make sure the grinding wheel turns freely without imbalance.

If the grinder has arrived in seemingly good order, remove it carefully from the pallet and follow the set up instructions.

C. SETTING UP AND RULES FOR SAFE OPERATION:

1. The grinder must be placed in an area where its sparks and flying steel dust will constitute no hazard. No inflammable fumes or liquids must be allowed to come within 20 feet of the grinder.

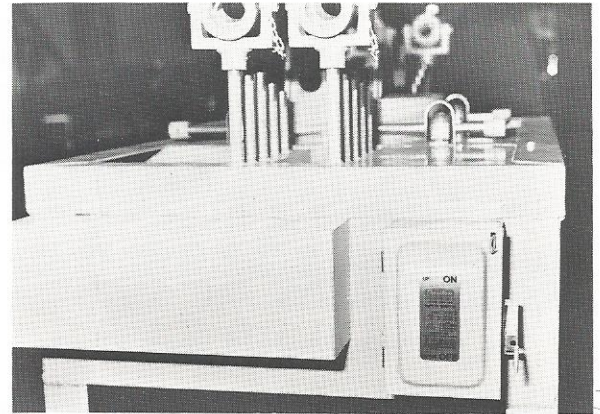


fig. 1

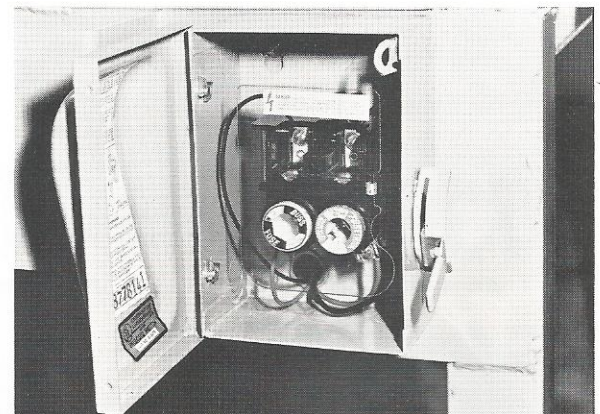


fig. 2

2. Set up the grinder near a suitable receptacle in order to avoid long extension cords. If extension cords are used, only suitable UL approved, 3-wire cords must be used, sized to carry the load of 9.6 amps at 125 volts. To prevent shock hazards, do not remove the ground plug from the power cord under any circumstances.
3. The operator and all persons approaching the grinder must wear goggles while the grinder is in operation.
4. The operator should wear gloves.
5. Do not allow anyone to operate this machine unless he is properly instructed and familiar with its operation.
6. The operator must stop the grinder when mounting, turning or removing the moil points or other tool steels.
7. Protect the grinder from moisture.
8. Frequently clean the grinder from grinding dust.
9. Do not use this grinder for any purpose other than that for which it is intended.

D. OPERATING INSTRUCTIONS:

1. Check proper position of the grinding wheel by placing a straight edge across the grinding wheel surface. The grinding surface should be 1/16" to 1/8" above the rim of the grinding wheel guard ring (see fig. 3). For correction, see "E. MAINTENANCE, paragraph b".
2. Insert proper tool cradle in tool transport slots (see fig. 4). Four sets of tool cradles are provided with each grinder to accommodate different size moil points or chisels. The tool cradles are numbered:  
  

No. 1: for 7/8" Hex  
No. 2: for 1" Hex  
No. 3: for 1-1/8" Hex  
No. 4: for 1-1/4" Hex  
No. 5: for PneuMoil (optional extra)
3. Turn fastening ring of tool holder so that thumb screw points upwards. Insert locator pin into tool holder, thereby fixing fastening ring in its position. (See fig. 5).

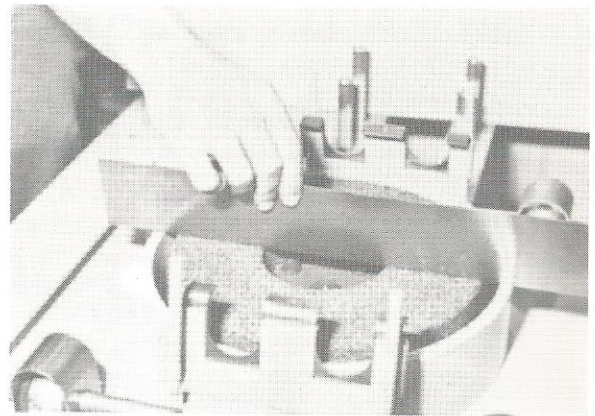


fig. 3

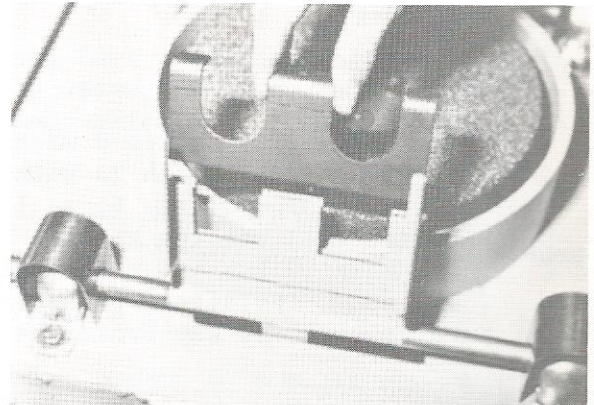


fig. 4



fig. 5

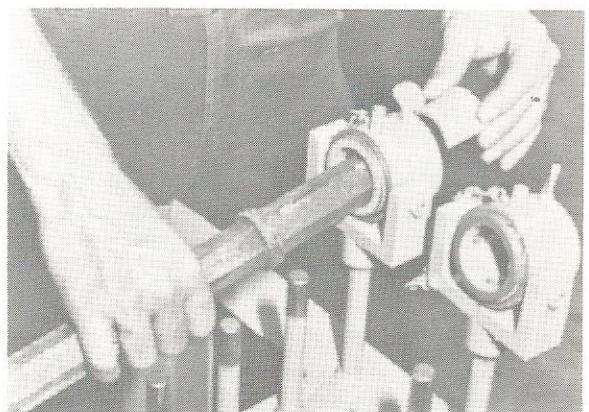


fig. 6

4. Insert moil point into tool holder and fit proper split halves. Two sets of split halves are provided with each grinder. The split halves are marked and will accommodate these tool steel sizes:

#1 -- 1-1/8" and 1-1/4" hex  
#2 -- 7/8" and 1" hex

Put the proper split halves around the tool steel shank and push them all the way into the tool holder until the shoulder of the split halves touches the holder. (See fig. 6.)

5. Adjust the position of the moil point tip on the grinding wheel. The tip of the moil point should reach approximately 1/2" over the edge into the hole in the center of the grinding wheel. A simple gauge can be used (see fig. 7).

Note: The length of the tool steel determines on which peg the tool holder must be placed. (See fig. 8.)

6. Rotate the tool steel in the holder until one of the four sides of a moil point, or one of the two sides of a chisel, are parallel to the grinding wheel surface.

Note: On new tools, two sides of the shank hexagon are parallel to two of the four sides of the tool tip. If a moil point has been ground by hand, this alignment may have been altered. If this has been the case, position the side of the shank hexagon which is best aligned to one of the four sides of the tip, parallel to the grinding wheel surface. (See fig. 9.)

7. Tighten thumb screw. Use pliers and tighten firmly. To insure proper tightening, make sure that the split in the split halves is at 90° to the axis of the thumbscrew. (See fig. 9)

Note: If a tool steel is worn to the extent that it has a "mushroomed" tip, it is advisable to remove the mushroomed portion on a separate grinding wheel before mounting the tool steel on the BURCO Grinder. This will prevent unusual wear of the grinding wheel. (See fig. 13.)

8. If advisable, put the provided weights over the points as shown in fig. 10.

Note: Reasons and considerations for using the weights or not using them are given in Section A: DESCRIPTION, para. 4 and 7.

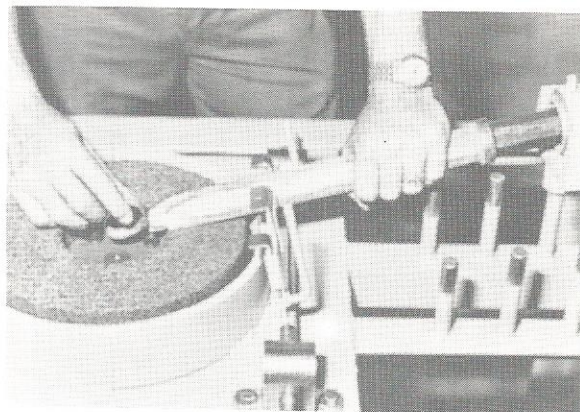


fig. 7

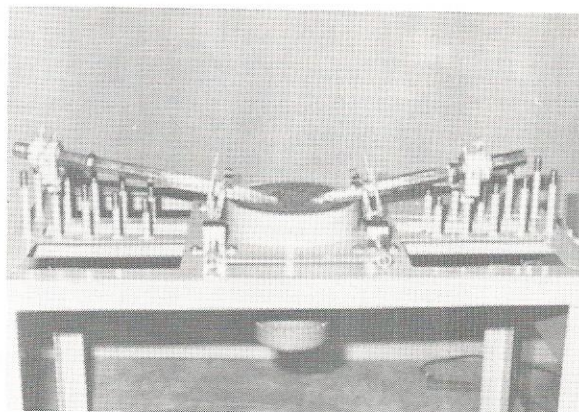


fig. 8

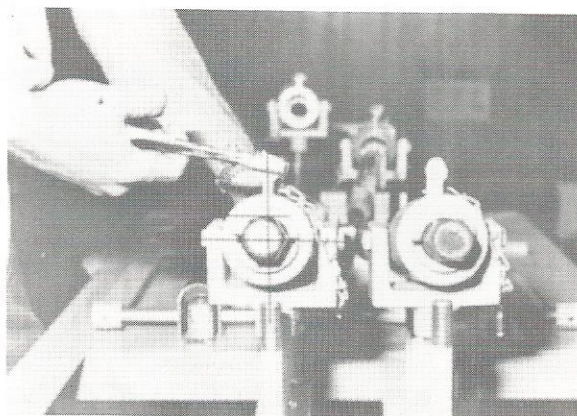


fig. 9

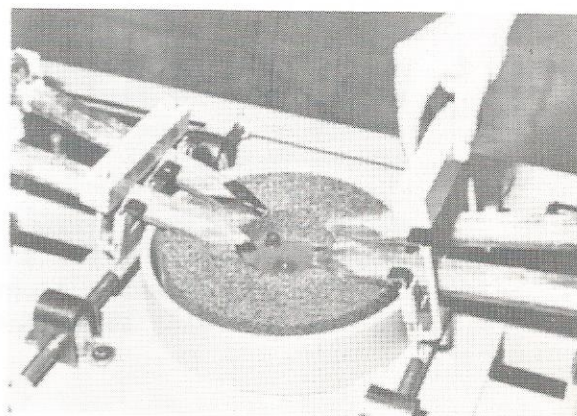


fig. 10

9. Switch on the machine.
10. When the grinding of one side of the tool steels is completed, switch off the grinder. Turn the tool steels to the next position.

Take these steps:

1. Pull locator pin out of the holder and turn a moil point  $90^{\circ}$ , a chisel  $180^{\circ}$ .
2. Re-insert locator pin.
3. Switch on the grinder.

Note: Do not grind the moil point tip to a fine point. A fine point will not sustain the impact of the breaker blow. The tip will break off or bend. Do not grind more than shown in fig. 11. The final tip must have a steep angle (see fig. 12) which should be ground by hand on a separate grinding wheel.

11. Special adapters for the grinding of tool steels other than standard moil points and chisels can be provided upon special request.

- I. A set of special adapters for PneuMoils, a product of Delsteel, is available. (See fig. 14). For the sharpening of PneuMoils, take these steps:

- a. Insert tool cradle #5 (see paragraph D.2, fig. 4).
- b. Mount peg extension on proper peg and fit tool holder. (See fig. 14.)
- c. Insert PneuMoil into tool holder, following directions of paragraphs D.3, 4, 6 and 7.
- d. Position PneuMoil tip half way between center hole and outer circumference of the grinding wheel. (See fig. 14.)
- e. Switch on the grinder.
- f. Note: The cutting edge of the PneuMoil is offset from the center and should be precisely at the end of the guide line groove of the PneuMoil.

Therefore: First, grind the PneuMoil as shown in fig. 14 until the guide line touches the grinding stone surface. (Cradle #5 will normally prevent excessive grinding).

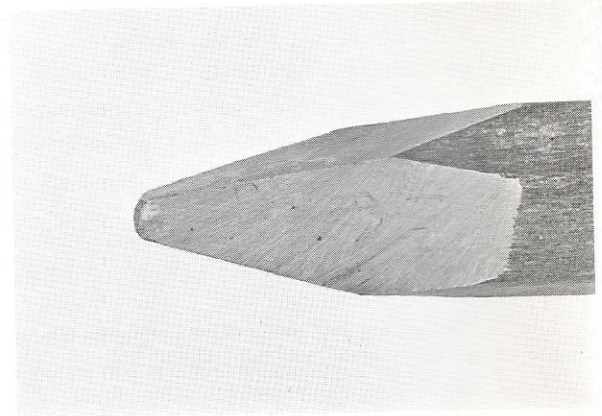


fig. 11

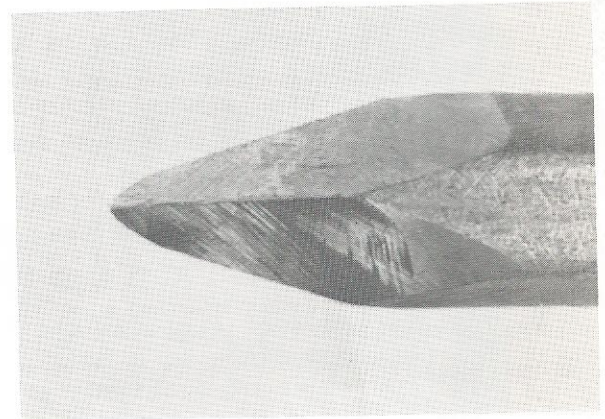


fig. 12

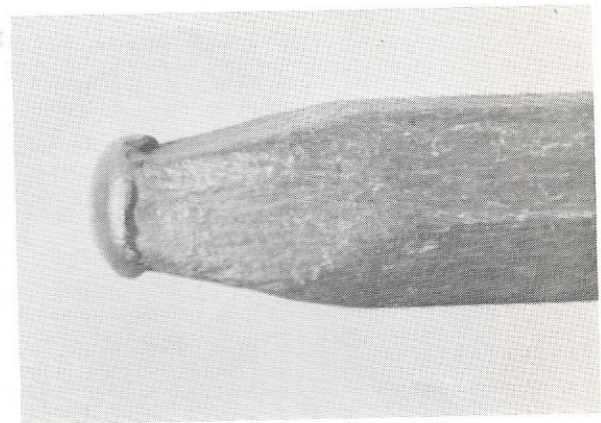


fig. 13

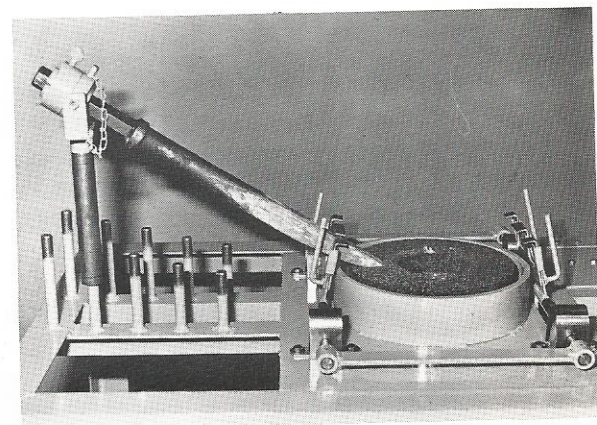


fig. 14

Then, stop the grinder and turn the PneuMoil 180°. Grind the short counter face so that the cutting edge is precisely at the end of the guide line. This is a short but important procedure. Stay with the grinder and observe it.

Delsteel provides a PneuMoil grinding gauge which should be used to verify the proper angles and the position of the cutting edge.

- II. A set of special adapters for small tool steels, such as used with Bosch electric hammers, is also available. (See fig. 15, 16 and 17).

For sharpening of small tool steels, take these steps:

- a. Insert tool cradle #1 (see paragraph D.2, fig. 4).
- b. Insert tool steel into extension sleeve as shown in fig. 15 and tighten thumbscrew.
- c. Insert tool steel with extension sleeve into tool holder following the procedures as described under Paragraph D.3 and 4 using the #1 split halves (see fig. 16.)
- d. Adjust the position of the moil point tip on the grinding wheel. The tip of the moil point should just reach the edge of the hole in the center of the grinding wheel. (See fig. 17.)
- e. Follow the steps as described under paragraph D.6 through 10.

Note: The BURCO Grinder is designed to restore the tip on 7/8" through 1-1/4" hex tool steels to the original angle as it can be found on new tool steels. This angle is somewhat steeper than the angle on small tool steels used on Bosch hammers, for instance. Therefore, on these small tool steels a steeper angle than the original one will be the result of re-sharpening on the BURCO Grinder.

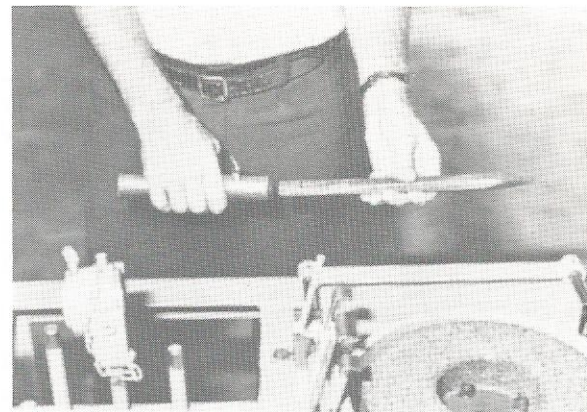


fig. 15



fig. 16

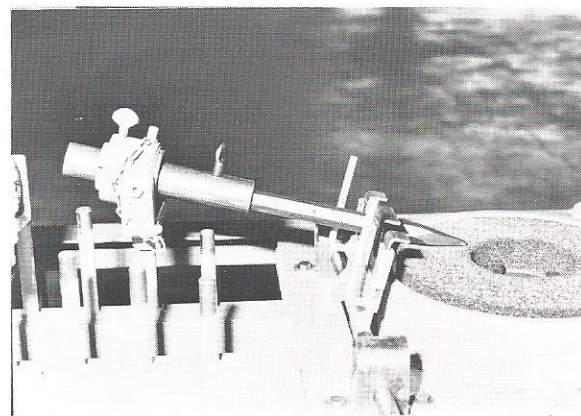


fig. 17

## E. MAINTENANCE:

### a. General Maintenance:

The BURCO Grinder is designed for minimum maintenance. However, certain basic requirements must be met:

1. Keep the interior of the switch free of dust by blowing it out periodically with compressed air.
2. Use proper fuses (see paragraph A 9.) and keep them properly installed.

Note: For further information on maintenance concerning the electrical equipment, please refer to the enclosed "Installation Instructions and Parts List" of the equipment manufacturer.

Warning: To insure against shocks, unplug power supply cord before opening safety switch cover.

3. Apply a few drops of regular lubricating oil daily to the transport shaft felt seals (see fig. 18.)
4. Replace felt seals if they hardened and no longer fit tightly around the shafts.

### b. Adjusting the height of the grinding wheel:

The position of the grinding wheel in relation to the tool transport is adjustable. The grinding surface should be approximately  $1/16"$  to  $1/8"$  above the rim of the wheel guard. For measurement and adjustment, place a straight edge across the face of the grinding wheel (see fig. 3). Loosen the four bolts of the grinder motor mount and turn adjusting screws until the desired new position of the grinding wheel is reached (see fig. 19). Then tighten up the four motor mount bolts again.

### c. Truing and dressing of the grinding wheel:

1. Dressing a wheel is intended to improve or alter its cutting action. It removes the outer layer of dulled, loaded or glazed abrasive grains and presents new and sharp grains to the work surface. Should the grinding wheel need dressing, a standard wheel dressing tool (such as the Desmond No. 0) can be used by pressing the dresser against the rotating surface of the grinding wheel and moving it across (see fig. 20).
2. Under normal circumstances and with proper usage, the grinding wheel will wear evenly. Should, for any reason, the grinding wheel surface become uneven, which would impair its proper functioning, an optional wheel dressing tool is available for the truing of the grinding wheel.

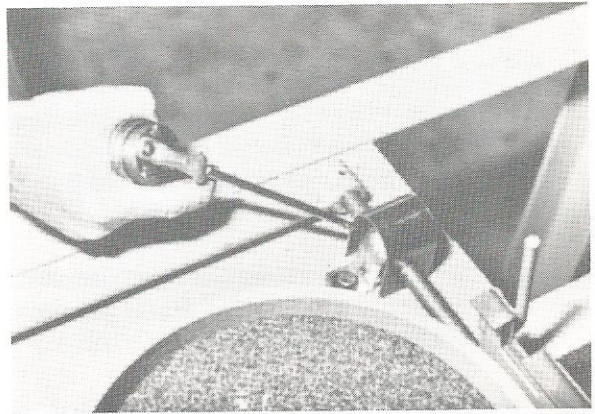


fig. 18

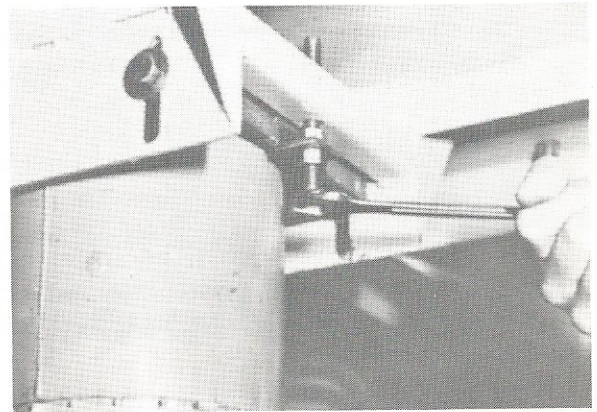


fig. 19



fig. 20

Take these steps:

- a. Mount wheel dresser on tool cradles No. 4 (see fig. 22). Make sure the holder hooks are tight. However, do not over-torque; you may bend the transport shaft or the tool cradle.
- b. Remove 2-amp fuse for the gear motor from the safety switch.
- c. Disconnect connecting rod of tool transport from tool transport motor (see fig. 21).
- d. Adjust the diamond so that it barely touches the highest point of the grinding wheel, while the grinding wheel is turned by hand. Tighten the counter nut.
- e. Switch on the grinding wheel motor.
- f. Move the dressing tool back and forth across the rotating surface of the grinding wheel by pushing the transport shaft with your hands. Begin from the outside. (See fig. 22)
- g. Adjust the diamond dresser downwards in small steps and repeat the truing procedure until the surface of the grinding wheel is even.

**Note:** To restore the full cutting action of the grinding wheel, a dressing procedure as described under paragraph E.c.1. must follow the truing procedure.

#### **F. WARRANTY:**

Burco, Inc. (hereinafter referred to as the "Company") guarantees its products for the period of 12 months from date of shipment against defects in material and workmanship, provided the equipment is properly installed and maintained and operated under normal conditions. Defective parts will be replaced provided they are returned to the Company with transportation charges prepaid.

Corrective or repair work on a grinder, for the account of the Company, shall be done only with the prior written consent of the Company.

Defects which can be corrected will not constitute grounds for return of the grinder.

In case of a problem with the electrical equipment, contact the manufacturer's nearest service station. See information on equipment name plate.

The Company is not responsible for consequential damages.

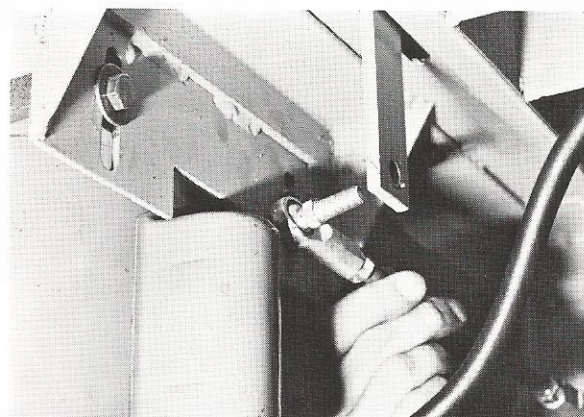


fig. 21

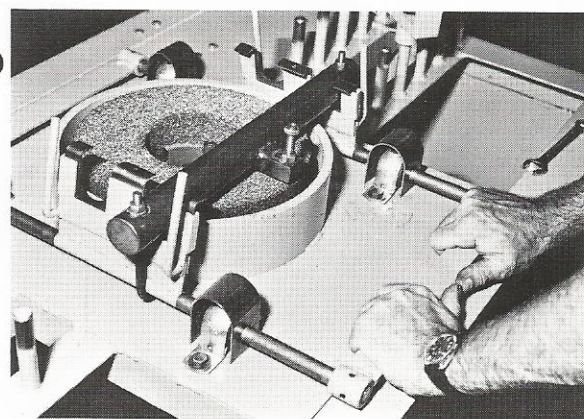


fig. 22

Manufactured by

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