UNIVERSAL MILLING MACHINE

SERVICING AND OPERATING INSTRUCTIONS

SCHAUBLIN 13

To be handed to the operative in charge of the machine.

Dimensions, weights and illustrations are for purposes of guidance only, and we reserve the right to alter the design at any time.

Machine N° : 140

BL N° . 79946

Voltage : 420

SCHAUBLIN LTD BEVILARD

TABLE OF CONTENTS

ENCLOSURES

Notice concerning maintenance of ING-1A
electric coolant pumps
Instructions regarding the motor
Index tables

SCHAUBLIN 13 UNIVERSAL MILLING MACHINE

PRINCIPAL TECHNICAL DATA

1. TABLE

Useful area	600 x 210 mm
Number of T-slots	4
Width of T-slots	12 mm
Spacing of T-slots	40 mm

2. TABLE MOVEMENTS

Longitudinal (by means of feed-spindle or lever)	260 mm
Vertical (by feed-spindle only)	310 mm

3. AUTOMATIC TABLE MOVEMENTS

8 longitudinal feeds	11 to 210 mm/min.
8 vertical feeds	11 to 210 mm/min.

4. HIGH-SPEED TABLE FEED

(only if specially ordered)

Longitudinal and vertical	1000 mm/min.

5. SPINDLE HEAD

Axial stroke (by feed-spindle or lever)	150 mm
External diam. of spindle nose	69,832 mm (2 3/4")
Internal taper	ASA B5 18-1943 N° 30
Spindle bore	15 mm
Diameter of cutter arbors, long and short	13-16-22-25,4-27 mm

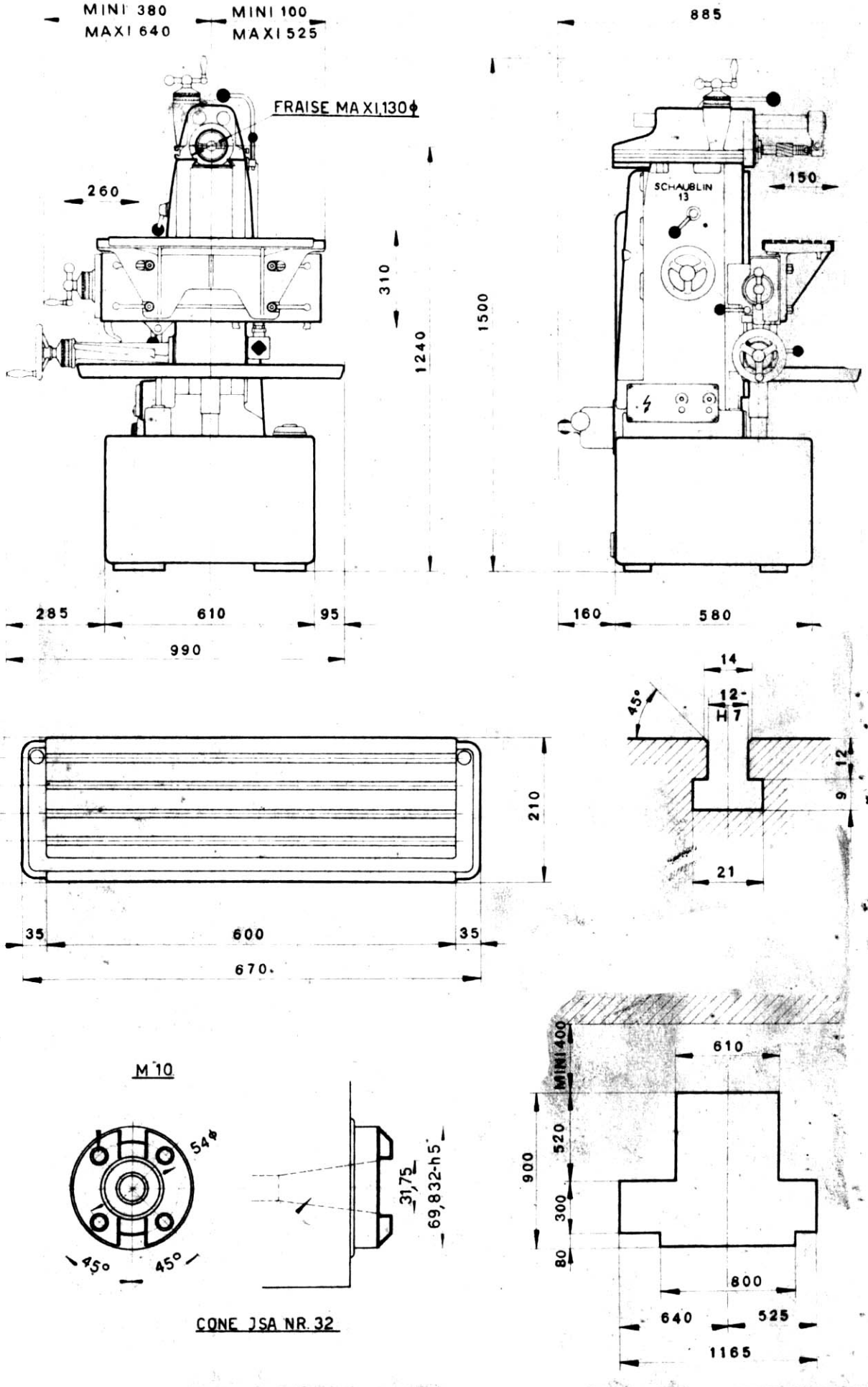
6. SPINDLE SPEEDS

(by infinitely-variable gear)	56 - 2100 r.p.m.

7. SPINDLE DRIVE MOTOR

Power	2 HP
Speed	1500 r.p.m.

8. Approximate net weight of machine	500 kilos (1100 lbs.)
Space required; length, depth, height :	124 - 80 - 150 cm.



CONE ISA NR 32

E R E C T I O N

HANDLING

On receipt of the machine, unscrew the top of case and remove sides, unscrew the four fixing bolts and take out the machine. Take care to recover any accessories which may be included among the packing.

The machine weighs approximately 500 kilos (1100 lbs.). When handling the machine with the aid of hoisting tackle, it should be slung as shown in the drawing on page 8. The hook should be wrapped with rags and the table is locked in its bottom position (without the swarf tray).

CONCRETE FOUNDATION

The Schaublin 13 Miller is designed for erection on a concrete foundation, the dimensions of the latter being as shown in the foundation drawing on page 8. The depth of the foundation will depend on the nature of the ground; the concreting should be done on firm ground only.

The electric supply leads can be laid either above ground, through the gap between the floor and the frame, or underground along a channel leading to point 4. In this latter case it is advisable to provide in the concrete foundation a steel pipe 2 with an inside diameter of 26 mm., 155 mm. long. The electric supply cable must project about 24" above the floor.

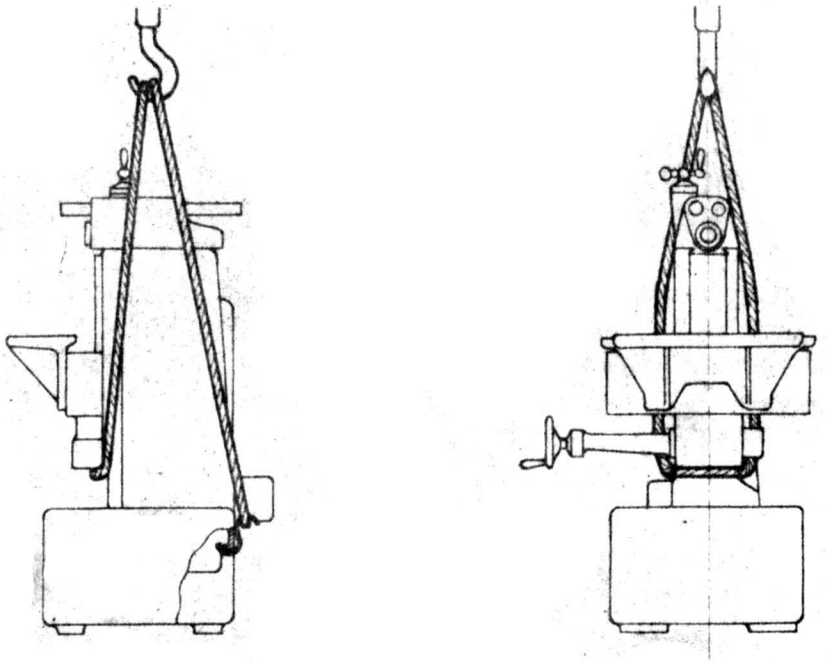
The machine is secured to the concrete foundation by means of 4 stay-bolts 1, these latter being first inserted in the holes provided in the concrete. With the aid of 4 flat steel strips 3, placed under the feet of the machine, the latter is levelled and vertically trued by means of a precision spirit-level. When this has been done, the staybolts, iron strips and machine feet are grouted in with cement, care being taken to keep the machine correctly levelled and trued.

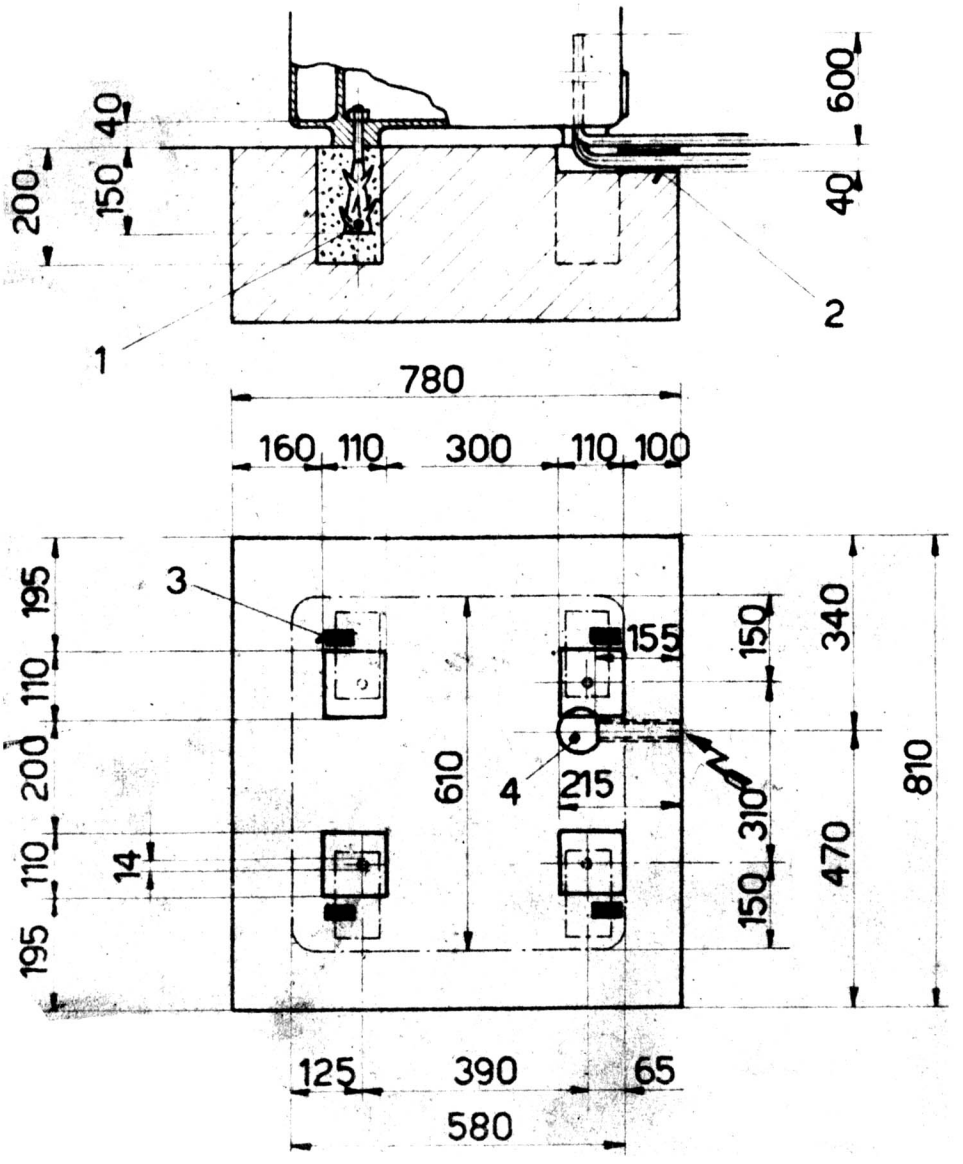
The holes provided in the machine base to accommodate the fixing bolts are 14 mm. in diameter. The stay-bolts, nuts and strips for fixing the machine are not supplied with the latter.
The machine must be accessible from every direction. (see page 6).

CLEANING

Only clean, chemically neutral and preferably white rags should be used for degreasing and cleaning.

First remove the anti-rust grease with a dry scouring cloth, and then wipe the surfaces over with a rag dipped in paraffin and wrung out. The anti-rust grease has no lubricating properties whatever, and must be completely removed as its presence may cause serious seizing, often weeks after the machine has been started up. Care should be taken during cleaning operations to ensure that no scratches are produced, especially on the saddle and milling-spindle head guides.
Finally, all bright surfaces should be coated with a light film of lubricating oil.




600
40
40
150
200
1
2
780
160
110
300
110
100
195
110
200
110
195
3
155
150
340
610
4
215
310
810
14
150
470
125
390
65
580

LUBRICATION AND MAINTENANCE

Before the Miller is started up, all its operative parts must be thoroughly oiled. We recommend for this purpose an oil having the following characteristics:-

VISCOSITY 4,5°E at 50°C

The viscosity of the oil in the two oil baths must not exceed 4,5°E at 50°C. The following is the correct procedure for filling the oil baths:-

GEARBOX OIL BATH

Slacken screw 5 and remove clamping-piece 6. Pull one of the surrpoting arms 7 rearwards until the passage between the arm guide hole and the clamping hole is clear. Fill, through the apertune thus provided, up to the mark on the oil level gauge 8. Drain by removing screw 9. (See page 10, A, and page 21)

FEED BOX OIL BATH

Unscrew oil-level indicator 10 and fill up until the gears dip into the oil (test by turning the wheels). A quantity of 0,2 litre (about 1/3 pint) is sufficient. Drain by unscrewing screw 11. (See page 10, B).

DRAINING THE OIL BATHS

Once a year, drain the two oil baths, swill them out with paraffin, and refill.

LUBRICATING THE VARIATOR

Remove the cover 12 and fill the small reservoir with oil. Check oil level weekly.

LUBRICATING THE MOTORS

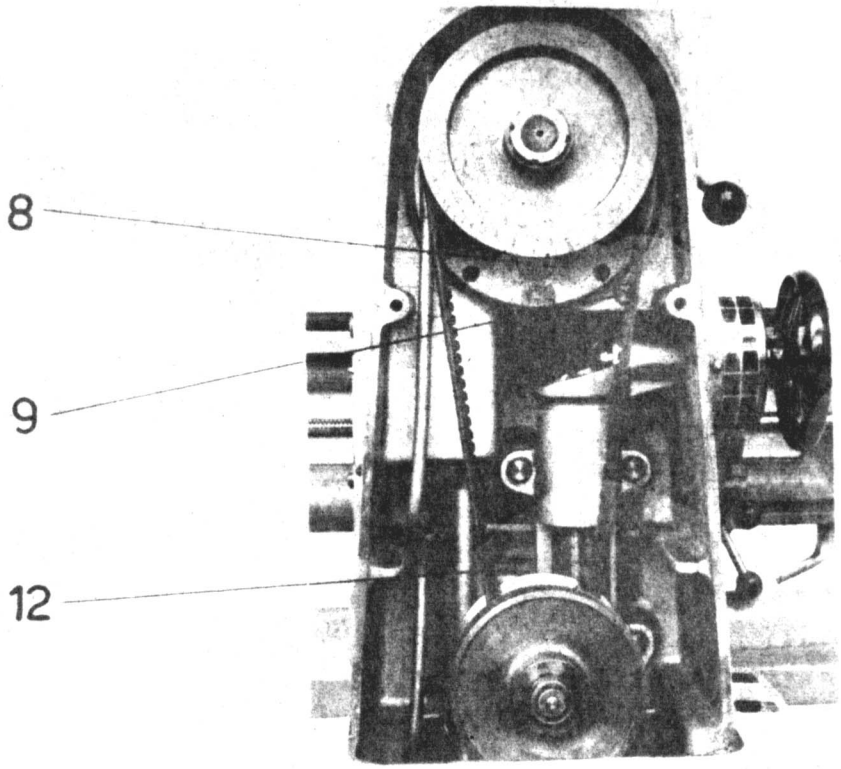
The bearings of the main drive motor, the high-speed feed motor and the coolant pump motor should be greased with ball-bearing grease. The instructions enclosed herewith contain full particulars as to maintenance and lubrication of the motors.

PRESSURE LUBRICATION

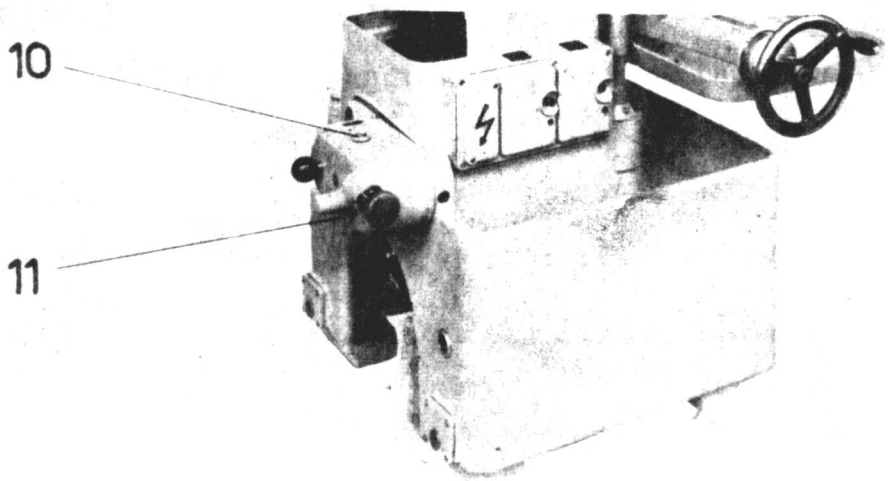
The other parts of the machine are lubricated once a week by injection oil with an oil gun. All lubricating points are indicated on page 11. 4 to 5 shots of oil per nipple are sufficient.
The feed box is to be lubricated 2 - 3 times a week through red oil nipple.

LUBRICATING THE VERTICAL FEED-SPINDLE

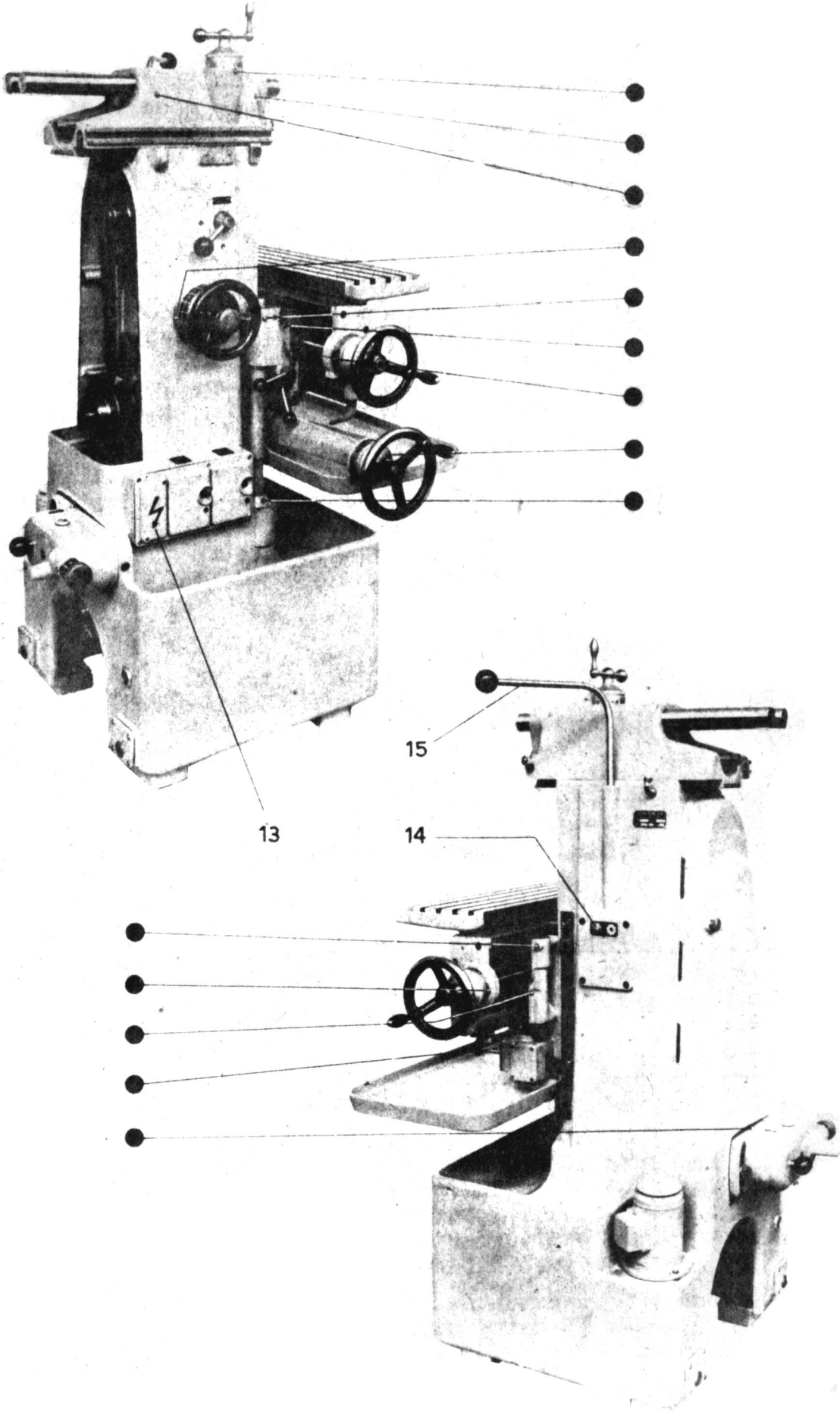
Raise the table to its top position. Lift the telescoping guard tubes and oil the feed-spindle with a hand oilcan. This operation should be performed once weekly.



A



B


15
13
14

E L E C T R I C A L E Q U I P M E N T

The Schaublin 13 Universal Miller is always delivered with complete electrical equipment (motors, switches, motor protection switches and wiring) ready for connecting to the mains. Before connecting the machine up to the mains, make sure that the voltage specified on the machine data plate tallies with that of the mains supply. For wiring diagram, see page 14.

CONNECTING UP

The machine is normally supplied with three-phase motors. The mains connection terminals RST are located in the terminal box 13, this being in the base. The machine is earthed via the yellow terminal in the terminal box. When the current is switched on, make sure that the motors are running in the correct direction, the procedure being as follows:-

Place the screw 14 in the centre of that of the 2 milling cutters outlined on the plate that corresponds to the cutter fitted to the milling spindle, and turn the control lever 15 in the direction now possible. The milling spindle must now rotate in the direction indicated on the plate. (See page 11).

DESCRIPTION OF THE EQUIPMENT

The Miller is equipped with three motors; one for the milling spindle drive and table feeds, one for the high-speed table feed, and one for the coolant pump.

SPINDLE AND TABLE-FEED MOTOR 16

Type Oerlikon N84-2-4, three-phase, short-circuited rotor, power 2 HP, speed 1410 r.p.m. Connection box on right as viewed from end of shaft.

HIGH-SPEED FEED MOTOR 17

Type Schindler KDWF03, power 0,3 HP, speed 2800 r.p.m. 3 x3 mm. key on end of shaft.

COOLANT PUMP MOTOR 18

Vertical type, power 0,1 HP, speed 2800 r.p.m.

The spindle and pump motors are controlled and protected by the "CMC" switching contactors 19, type VTp 15, mounted in the machine frame. In the event of the motors being overloaded for a protracted period, these contactors automatically switch off. The motors are restarted by pressing push-buttons 20 ans 21 (See page 17).

Switch 22 is used for switching on and reversing the milling spindle motor, lever 15 being moved to left or right according to the position of screw 14.

Switch 23 enables the high-speed feed motor to be switched on by means of a pedal 24 provided in front of the base.

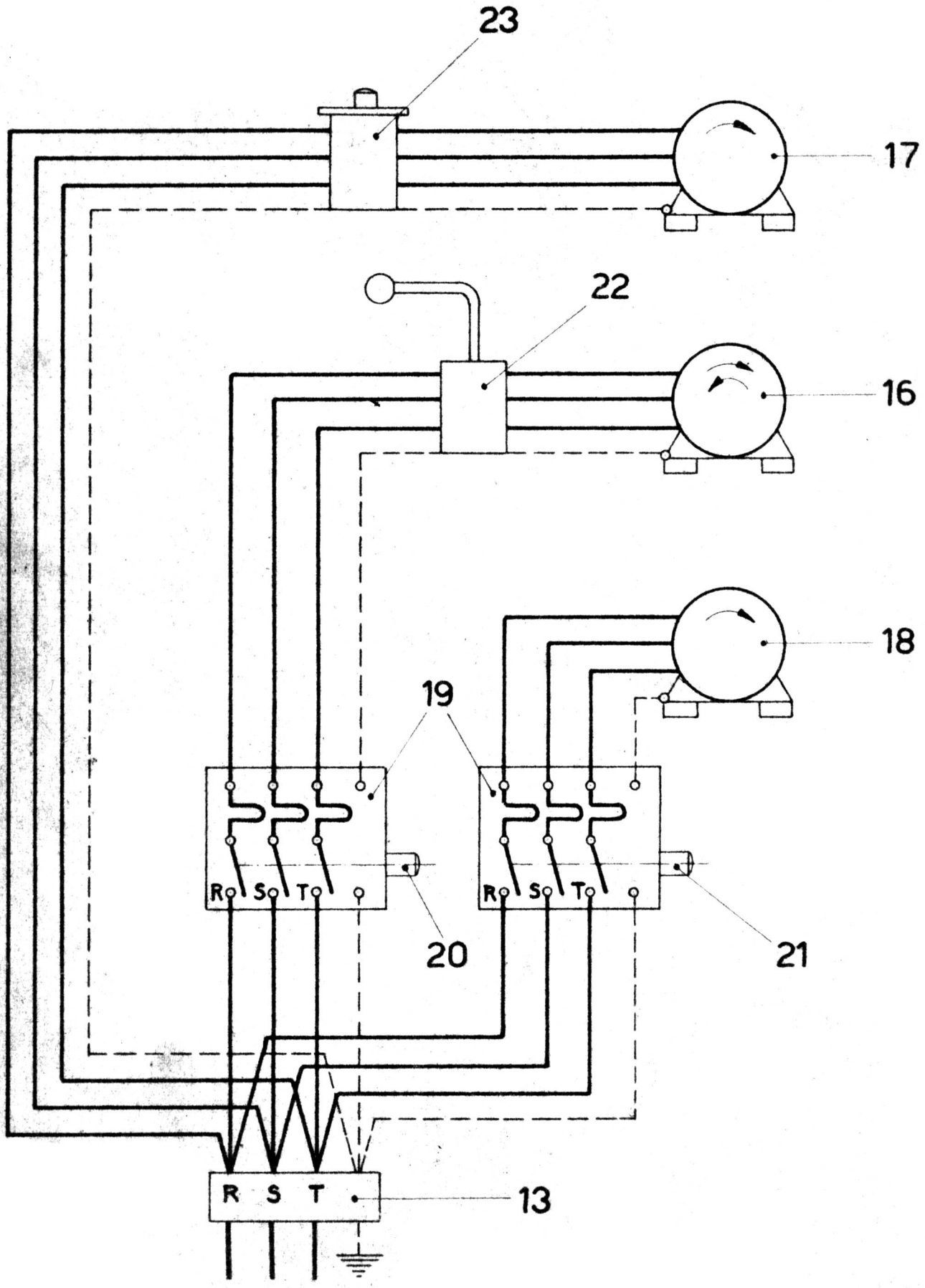
This motor is protected from overloading by a friction clutch.

The coolant pump motor is switched on by means of the push-button 21 of the contactor located underneath the plate showing a cock.

Directions concerning the motors are attached to these present instructions.

STARTING UP

When all instructions regarding erection, cleaning, lubrication and electrical equipment have been carried out, start the machine up and let it run idle for several hours. Start with a low speed to enable the bearings and transmission members to warm up normally, then gradually increase to maximum speed. Check the proper functioning of each part.


23
17
22
16
18
19
R
S
T
20
R
S
T
21
R S T
13

SPINDLE HEAD

The spindle head can be moved axially on the head frame by means of a handwheel 25, with vernier, accessible from all directions. The screw spindle has a pitch of 4 mm. The vernier is graduated in 2/100 mm. and can be set at zero. The milling spindle 26, of hardened chrome-nickel steel, runs in high-precision ball bearings. The spindle nose is of the following type: ASA B5 18-1943 N° 30 (dimensions see page 21).

For adjustment of spindle bearings, see page 20.

The front of the spindle head is machined and the two supporting arms 7 enable the special attachments and the outside bracket for guiding the long milling-cutter arbors to be mounted.

FRAME

The powerfully-ribbed frame is cast integral with the base in extremely hard alloy cast iron, and its lower part houses the drive members for the milling spindle and the feed gear, as well as the coolant tank.

The upper portion of the frame encloses the gearbox, in which all the gears are made of hardened and ground chrome-nickel steel. In conjunction with the speed regulator, which is likewise mounted in the frame, this gear provides the very wide range of speeds of 56 to 2100 r.p.m.

STARTING UP

Switch 22, housed in a case on the right-hand side of the frame, enables the milling spindle to be started up and reversed with the aid of the lever 15. This lever is locked by means of screw 14, so that the direction of rotation, once set, is maintained. If this screw is fitted in the centre of one the milling cutters sketched on the plate - the one corresponding to the cutter fitted to the spindle - the desired direction on rotation is automatically obtained.

When the machine is shut down for a protracted period, it is advisable to switch off the motor by means of the contactor indicated by a plate bearing the image of a milling cutter. The high-speed feed motor is started up by means of the pedal 24 and the push-button switch 23 located respectively in front of and on the base.

The coolant pump motor is started up by the push-button 21 on the contactor marked by a plate showing a cock.

CONTROL AND SELECTION OF THE SPINDLE SPEEDS

Speeds ranging from 56 to 2100 r.p.m., infinitely variable within these limits, are obtained by means of a belt-type speed-change gear. The drive is transmitted from the motor to the speed regulator and the gearbox by means of 2 vee-belts answering to the following specification:-

Make: Dayton Profile 1 1/32" x 11/32" Angle 30°
Mean length 48½".

For instructions as to adjustment of variator, see page 22.

SELECTION OF SPEEDS

The speed of the belt-type speed-change gear is varied by means of the handwheel 28, which is locked by means of the knob 29. The changeover from low to high speed is effected by the lever 30. Handwheel 28 must be operated with the motor running, whereas lever 30 must be operated only when the machine is at a standstill.

If, for instance, a spindle speed of 180 r.p.m. is desired, handwheel 28 must be turned until the figure 180 appears opposite the pointer 31. The colours on the spindle-speed scale tally with the colours marking the positions of the lever 30 (for 180 r.p.m., green).

Lever 15, operated in conjuction with a switch, enables the spindle to be run in either direction (see page 15, "Starting up").

VERTICAL SLIDE

HAND FEED

Hand feed is controlled by means of the handwheel 32. The vertical feed-spindle has a pitch of 4 mm. and the scale is graduated in 2/100 mm.; it can be set at zero.

LOCKING THE VERTICAL SLIDE

The vertical slide is locked by means of lever 33.

LONGITUDINAL SLIDE

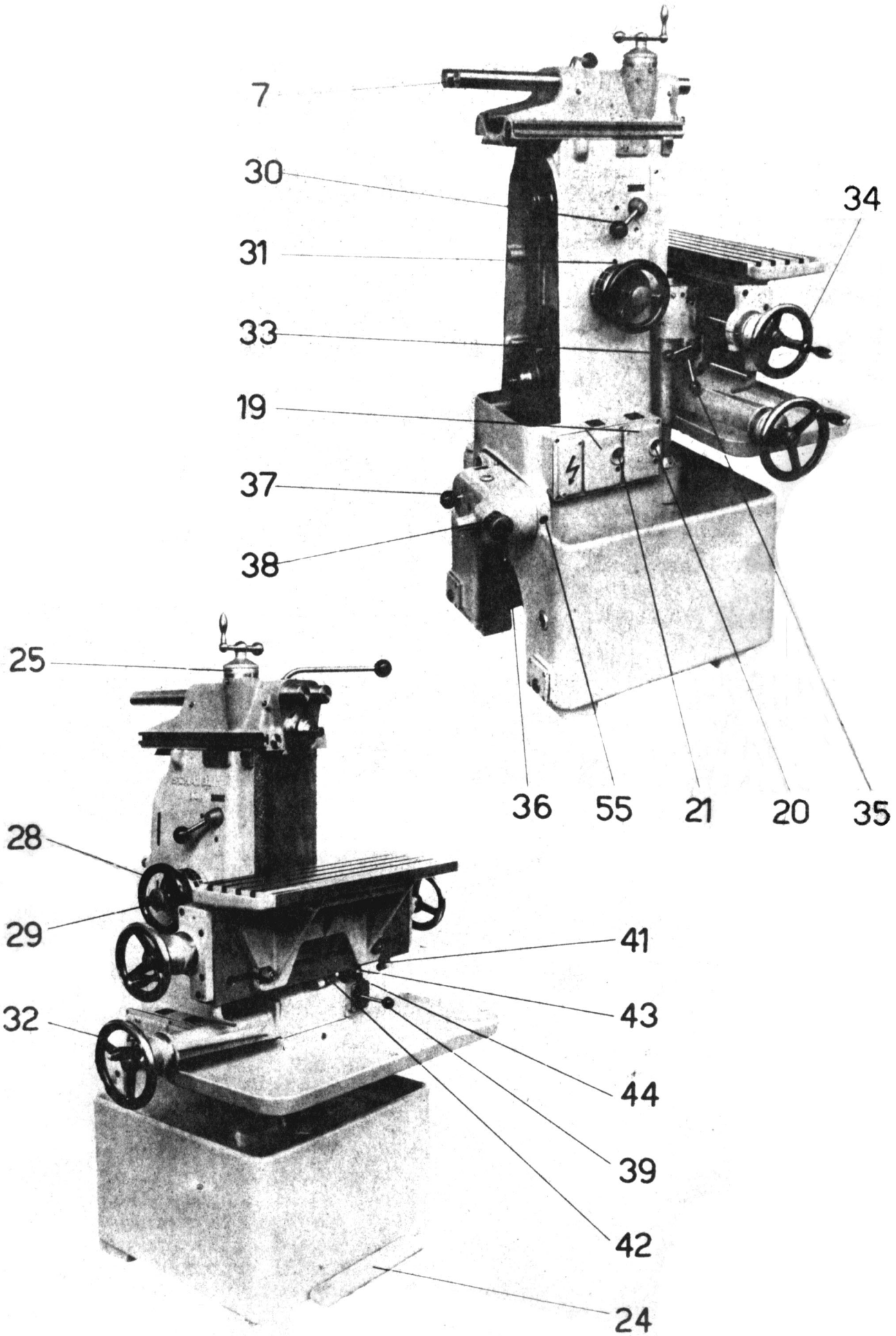
HAND FEED

Longitudinal hand feed is controlled by handwheel 34. The longitudinal spindle has a pitch of 4 mm. and the scale is graduated in 2/100 mm.; it can be set at zero.

LOCKING THE LONGITUDINAL SLIDE

The longitudinal slide is locked by means of lever 35.

ADJUSTING THE TAPER STRIPS of the vertical and longitudinal slides and spindle head; see page 24.


7
30
31
33
19
37
38
34
36
55
21
20
35
25
28
29
32
41
43
44
39
42
24

AUTOMATIC SLOW-MOTION VERTICAL AND LONG FEEDS

The feedbox, independent of the spindle speeds, enables 8 feeds (11 to 225 mm.) to be selected by operating lever 37 and turning knob 36. The feeds are read off the graduated ring 38 mounted on the knob 36. By means of a patented, automatic device the running direction of the milling spindle can be reversed (e.g., for left-hand cutters) without reversing the feed gear, thus proventing any wrong manipulations.

Accidents due to unforeseen overloads are prevented by a friction clutch. The drive is transmitted from the motor to the feed gear through a vee-belt ansvewing to the following specification:-

Profile 10 x 6 Angle 30° Inside length 750 mm.

If it is desired, for instance, to set a feed of 29 mm./min., knob 36 must be turned until the figure 29 is on top. The colours on the graduated ring 38, on which the number 29 is marked, indicate whether the lever 37 must be pushed or pulled (for 29 mm./min. green colour; pull lever 37). Whilst the motor is running, these operations can be performed on the lower feed range only.

The feed set in mm./min. applies both to the vertical and to the long feed.

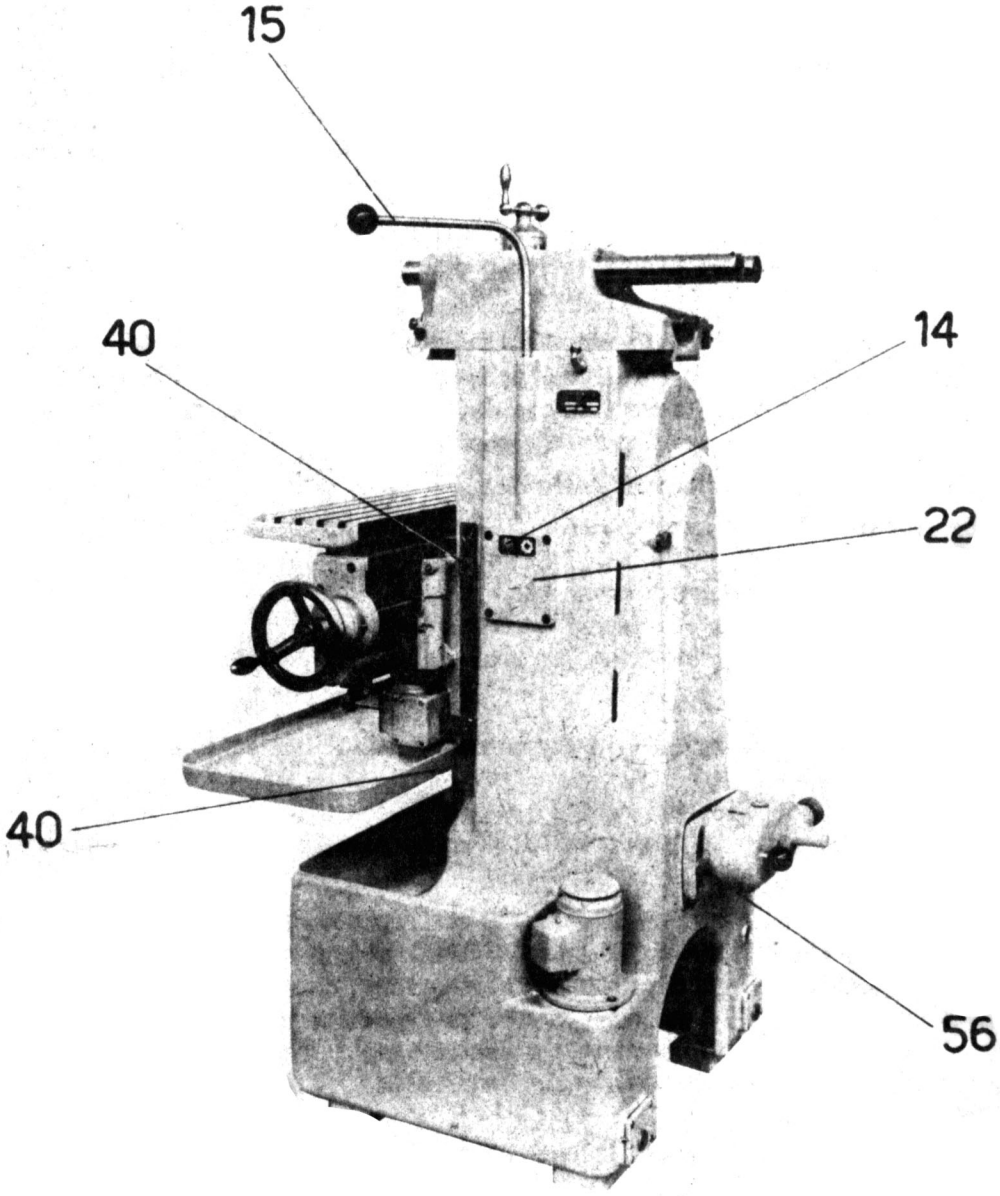
The automatic feed is disengaged when lever 37 is in its middle position.

The automatic movements of the table are controlled by shifting a single lever, 39, in the direction of the desired feed. When this lever is shifted to the right, the table feeds to the right; when the lever is shifted upwards, the table moves upwards. With the lever in its middle position, the table remains stationary.

The adjustable trip blocks 40 and 41 automatically stop the table at the desired position. For stopping the long feed, the automatic feed is first disengaged by a portion of the head of the set screw 42, which presses against the roller 43. Feed is then continued by hand until the set-screw 42 brings up by another part of its head against the fixed stop 44. In this way very accurate stoppage of the table in the desired positions is achieved. Never remove the end-stops 40 and 41.

LONGITUDINAL AND VERTICAL HIGH-SPEED FEED

The high-speed feed of 1000 mm./min. is independent of the slow-motion feeds and is actuated by a separate motor housed in the base. A slipping clutch is provided to prevent accidents and overloading; adjustment is not necessary. The motor switch is operated by pressing on the pedal 24 located on the front of the base. By means of a patented device, the high-speed feed can be engaged even when the table is already moving. This means that the table can be fed forward at high speed until pressure on the pedal 24 is removed, when the table will continue to feed forward under the actuation of the slow-motion feed gear, no manipulation of levers being required.


15
40
14
22
40
56

ADJUSTMENT

Only an experienced person should be entrusted with the operations of adjustment described below, because they require the greatest of skill.

MILLING SPINDLE HEAD

SPINDLE BEARING

The front-bearing is composed of a double row cylinder roller bearing 45,
type SKF NN 3010 KX/SP

The back-bearing has two taper roller bearings 46,
type 100.035 / 100.072 (accuray 2 microns) made
by La Précision Industrielle, Rueil-Malmaison (France)

These bearings are adjusted on mounting the milling machine. No readjustment is necessary until after a long time of run.

DISMANTLING OF THE SPINDLE

Previously the milling spindle head has to be taken off, taking into consideration the following instructions

1. Unscrew totally the set screw 57 (see page 25) and pull out the taper packing strip
2. Remove the strip 135 after having loosened 3 screws
3. Remove the milling spindle head towards the table, raising said head as much as possible in order to avoid a damage of the packing by the gear wheel.

The dismantling of the spindle is done as follows :

1. Remove the coverplate 137 held by six screws
2. Unscrew the locking screw 138
3. Loosen screw 47 and unscrew entirely cover 48
4. Take off nut 139 held by the safety washer on the spindle
5. Push out carefully the spindle, striking its back-end slightly with a lead hammer

TAKING UP RADIAL PLAY WITHIN THE FRONT-BEARING

1. Determine the exact amount of radial play by means of a dial having a division of 0,001 mm. (.00004 in.)
2. Remove the spindle 26 (see "Dismantling the spindle")
3. Tighten the nut 149 according to the radial play to be adjusted. A safety washer connects the ringnut 149 with the spindle.

   The slight taper of the inner race of bearing 45 obstructs a regular advance of the nut 140. To obtain the desired result, the nut should be struck concentrically by means of a tube placed on the spindle to cause a slight displacement of the inner race of the bearing 45 on the taper of the spindle 26, and nut 140 then retightened. By repeating this operation several times it will be found possible to turn nut 140 through the desired angle. Keep a careful check on the advance of nut 140, as it is difficult to restore the inner race of the bearing 45 if it is once moved too far forward on the taper.

   The advance of nut 140 is calculated, in respect of the radial play which has to be adjusted, as follows :

   $$\text{Advance of nut 140} = \frac{\text{bearing play to be adjusted in mm} \times 14}{\text{Pitch of nut 140 = 1,5 mm.}}$$

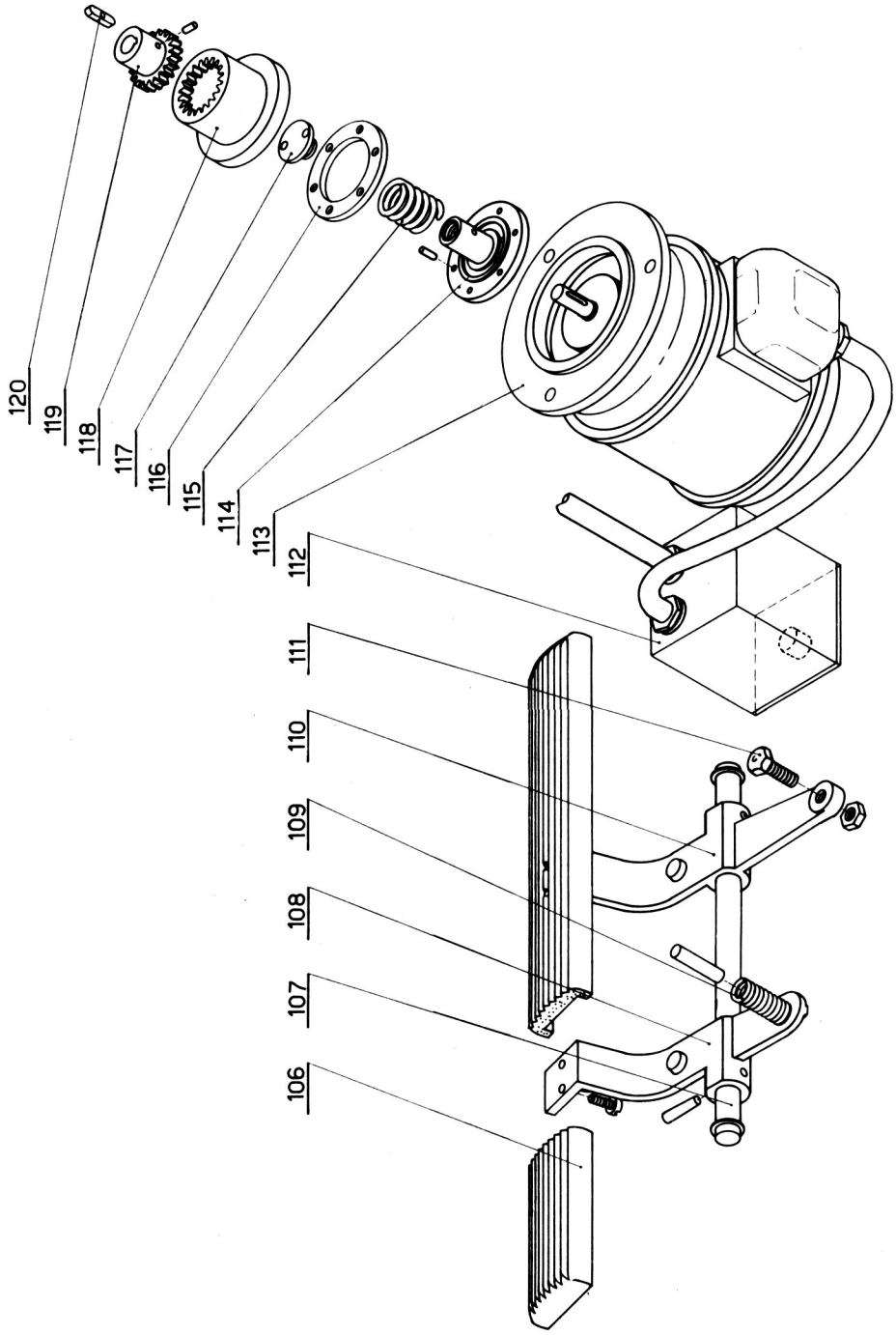
   Example: A radial play of 0,01 mm has to be adjusted.
   Advance of nut 140 = 0,01 mm x 14 = 0,14 mm or a rotation of 36° 36' corresponding to a length of 20,5 mm on the full diameter of nut 140 (diam. 70 mm).

4. Lock the nut 140 by means of the safety washer
5. Replace spindle 26 and test again the radial play of the front-bearing; it should be 0,002 mm (.00008") in order to obtain faultless running conditions. This test shall be made with ball bearings 46 in position and with roller bearing 45 absolutely dry.

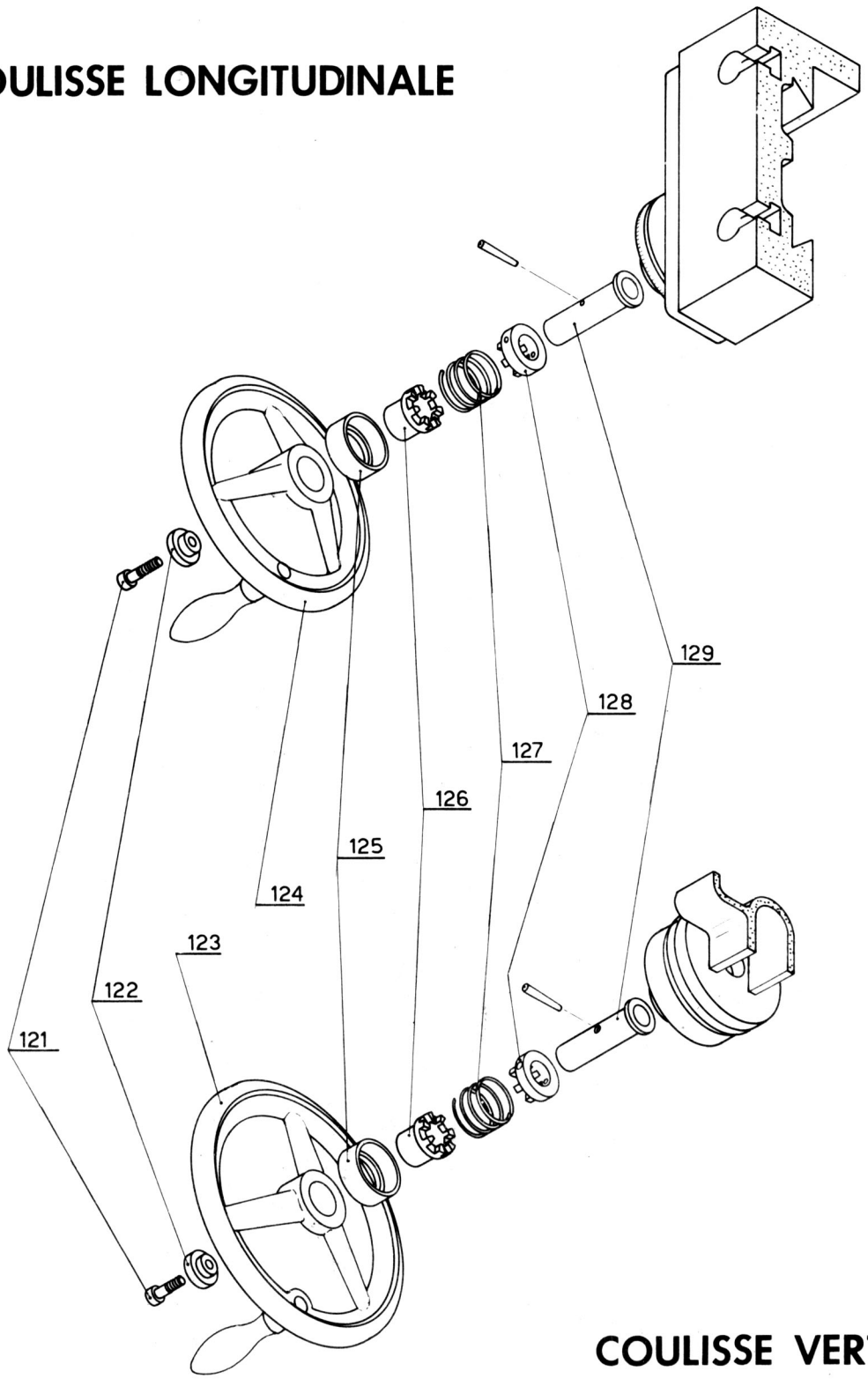
TAKING UP RADIAL AND AXIAL PLAY IN THE REAR-BEARING

1. Loosen screw 47
2. Screw in the cover 48 (pitch 1,25 mm) according to the amount of play which has to be adjusted
3. Firmly tighten screw 47 and test again the axial play of the back-bearing; it should be 0,01 mm (.0004") to obtain faultless running conditions. This test shall be done with taper roller bearings 46 absolutely dry.

DEPLACEMENT RAPIDE



COULISSE LONGITUDINALE



COULISSE VERTICALE

13 VOLANT DE DROITE DEBRAY. PR. DEPL. RAP.