

MODEL

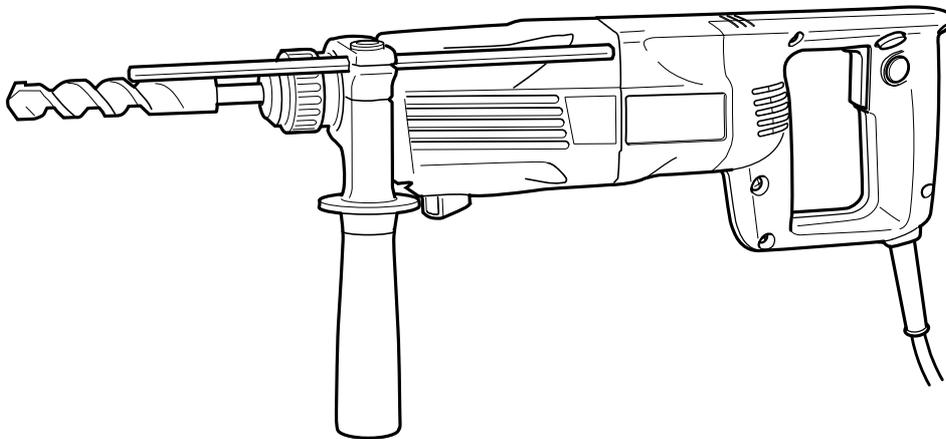
DH 24PE (S)
[3-Mode Action]

Hitachi
Power Tools

HAMMER DRILL
DH 24PE (S)
[3-Mode Action]

TECHNICAL DATA
AND
SERVICE MANUAL

D



LIST No. E440

Jan. 2004

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT



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1. PRODUCT NAME

Hitachi Hammer Drill, Model DH 24PE (S) [3-Mode Action]

2. MARKETING OBJECTIVE

This hammer drill provides three function modes, "rotation and striking", "rotation only" and "striking only". The latter is suitable for chiseling and grooving work.

The Model DH 24PE (S) is equipped with a variable locking mechanism that allows the angle of a tool such as a flat chisel to be adjusted in 36 positions in the "striking only" function mode. The fully renewed design offers users the promise of speediness, just like the other 24 mm hammer drill series. The Model DH 24PE (S) is compact and lightweight thanks to the same spiral drive system (that converts rotation into reciprocating motion by a reciprocating bearing) as that of the Model DH 24PB.

(Note) The Model DH 24PE (S) is different from the current Model DH 24PE (2-mode action) in construction.

This manual is specially prepared to explain the Model DH 24PE (S) and also to avoid mistakes in disassembly or reassembly at maintenance.

3. APPLICATIONS

(1) Rotation and striking function

- Drilling anchor holes
- Drilling holes in concrete, tile, brick and similar materials

(2) Rotation only function

- Drilling holes in steel and wood (with chuck adapter)
- Tightening and loosening machine screws and wood screws (with chuck adapter)

(3) Striking only function

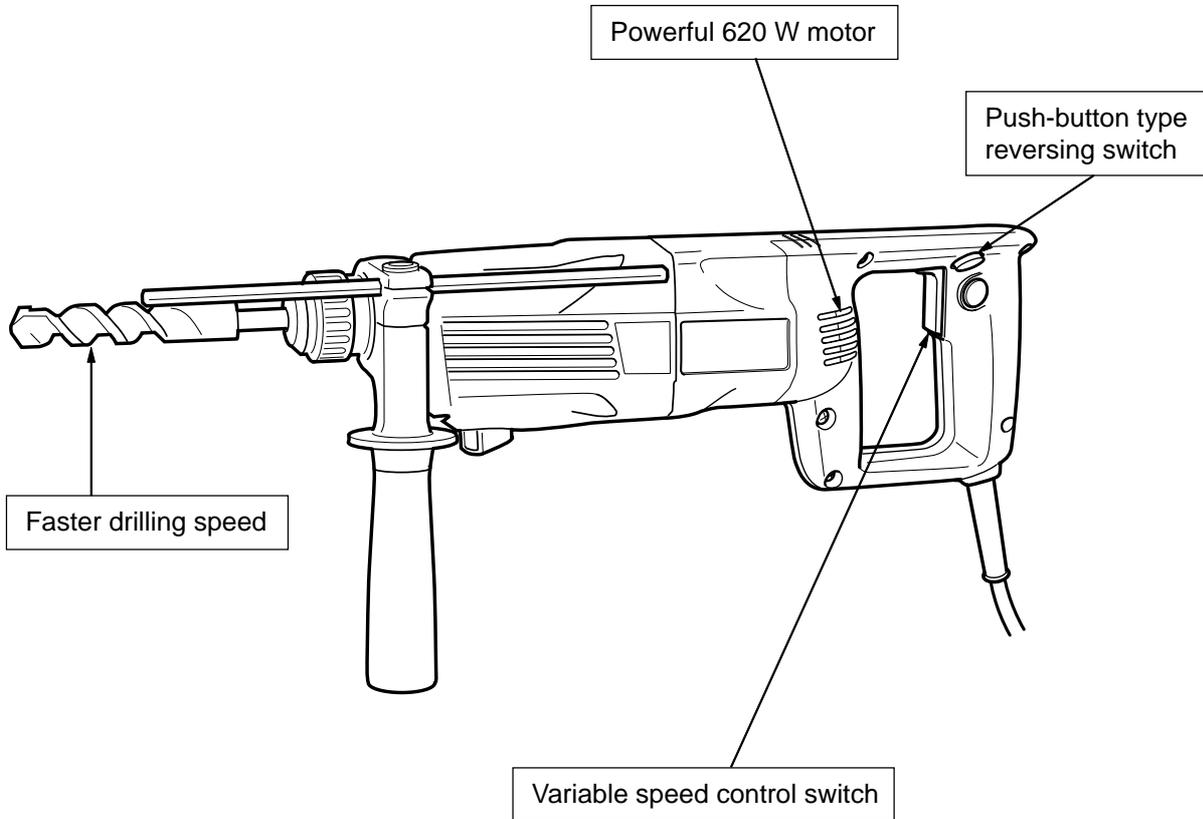
- Light-duty chiselling of concrete
- Groove digging and edging

[Typical applications]

- Air conditioning Installation of air conditioners, water coolers and heaters, and air ducts
- Piping and plumbing Installation of gas, water and sanitary facilities
- Electrical work Installation of light fixtures and various electric appliances
- Interior decoration Installation of seating, display stands and partitions
- Other civil engineering, construction and repair work

4. SELLING POINTS

Maker•Model	Weight	Overall length
Hitachi DH 24PE (S) :	2.5 kg (5.5 lbs.)	407 mm (16-1/32")



4.1 Selling Point Descriptions

(1) Compact and lightweight

Maker-Model	Weight	Overall length
Hitachi DH 24PE (S)	2.5 kg (5.5 lbs.)	407 mm (16-1/32")

The Model DH 24PE (S) with D-shaped handle has the same striking mechanism as the Model DH 24PC equipped with reciprocating bearing.

The overall length is significantly reduced and it is one of the most lightweight hammer drills in this class.

(2) First-rate drilling speed

The Model DH 24PE (S) has great striking energy owing to the optimum design of the rotation speed, striking frequency and the weight of striker.

(3) Powerful 620 W motor

The input of motor is 620 W, the same as that of the Model DH 24PC. This is a powerful hammer drill that is also compact and lightweight.

(4) Fully renewed design

The aggressive and powerful styling promises supreme efficiency. The convenient handle shape ensures excellent operability when drilling. The handle fits comfortably in the palm of hand when pressing against workpiece.

(5) Variable speed control switch with superior dust protection and operability

The variable speed control switch allows the rotation speed to be changed freely throughout the drilling operation. This permits easy centering and positioning, and ensures more effective drilling into fragile materials such as tile and brick.

(6) Equipped with reversing switch

By utilizing the newly designed optional accessory chuck adapter and appropriate driver bits, and through the combined functions of the variable speed control switch and reversing switch, the Model DH 24PE (S) can be used to tighten and loosen a variety of screws.

5. SPECIFICATIONS

5-1. Specifications

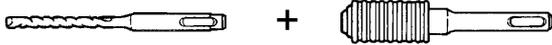
Model		DH 24PE (S)		
Capacity	Concrete	3.4 – 24 mm (1/8" – 15/16")		
	Steel	13 mm (1/2")		
	Wood	32 mm (1-1/4")		
Power source		AC single phase 60 Hz		
Voltage, current and input		Voltage (V)	Current (A)	Input (W)
		115	5.7	620
Rotation speed	No-load	0 – 1,350/min.		
	Full-load	0 – 800/min.		
Full-load blow		0 – 4,400/min.		
Type of motor		AC single-phase commutator motor		
Type of switch		Variable speed control switch and reversing switch		
Type of handle		D-type handle of main body and side handle		
Enclosure		Housing } ... Glassfiber reinforced polyamide resin (green) Handle cover } Gear cover Glassfiber reinforced polyamide resin (black)		
Weight	Net	2.5 kg (5.5 lbs.)		
	Gross	4.8 kg (10.6 lbs.)		
Packaging		Corrugated cardboard box with case		
Standard accessories		(1) Case 1 (2) Side handle 1 (3) Depth gauge 1		

* Weight excludes cord and side handle.

5-2. Optional Accessories

A. Drilling anchor holes (rotation + striking)

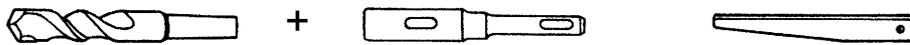
- Drill bit (slender shaft)



- (1) Drill bit (slender shaft) (2) Adapter for slender shaft
(SDS-plus shank)

Drill bit (slender shaft)				Adapter for slender shaft
Outer dia. (mm)	Effective length (mm)	Overall length (mm)	Code No.	Code No.
3.4 (1/8")	45 (1-25/32")	90 (3-17/32")	306369	306370
3.5 (9/64")	45 (1-25/32")	90 (3-17/32")	306368	

- Drill bit (taper shank)



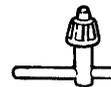
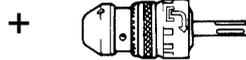
- (1) Drill bit (taper shank) (2) Taper shank adapter
(SDS-plus shank) (3) Cotter

(1) Drill bit (taper shank)		(2) Taper shank adapter		(3) Cotter
Outer dia. (mm)	Code No.	Type	Code No.	Code No.
11 (7/16")	944460	Morse taper No.1	303617	944477
12.3 (31/64")	944461			
12.7 (1/2")	993038			
14.3 (9/16")	944462			
14.5 (73/128")	944500			
17.5 (11/16")	944463			
21.5 (27/32")	944464	Morse taper No.2	303618	

Part name	Code No.	Taper shank adapter (A-taper or B-taper) is provided as an optional accessory, but drill bit is not provided.
A-taper	303619	
B-taper	303620	

- 13 mm hammer drill chuck

For drilling operations when using a straight shank bit for impact drilling with a hammer drill.



(Straight shank bit for
impact drills)

13 mm (1/2") hammer drill
chuck (SDS-plus shank)

Chuck wrench

Part name	Code No.
13 mm (1/2") hammer drill chuck (including chuck wrench)	303332
Chuck wrench	303334
Rubber cap	303335

B. Anchor setting (striking only)

- Anchor setting bar to permit anchor setting operation with the hammer drill

Anchor setting bar



Anchor setting adapter (SDS-plus shank)

Part name	Overall length	Code No.	Part name	Overall length	Code No.
W-1/4 Anchor setting adapter-A	260	302976	W-1/4 Anchor setting adapter-B	260	302979
W-5/16 Anchor setting adapter-A	260	302975	W-5/16 Anchor setting adapter-B	260	302978
W-3/8 Anchor setting adapter-A	160	303621	W-3/8 Anchor setting adapter-B	160	303622
W-3/8 Anchor setting adapter-A	260	302974	W-3/8 Anchor setting adapter-B	260	302977
Internal cone type			External cone type		

- Anchor setting bar for manual anchor setting

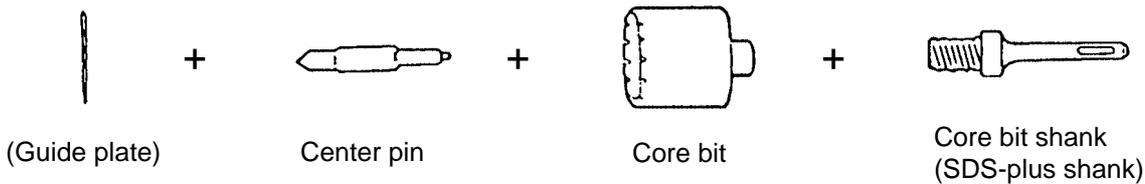


Anchor setting adapter

Part name	Code No.	Part name	Code No.
W-1/4 Anchor setting adapter-A	971974	W-1/4 Anchor setting adapter-B	971799
W-5/16 Anchor setting adapter-A	971795	W-5/16 Anchor setting adapter-B	971800
W-3/8 Anchor setting adapter-A	971796	W-3/8 Anchor setting adapter-B	971801
W-1/2 Anchor setting adapter-A	971797	W-1/2 Anchor setting adapter-B	971802
W-5/8 Anchor setting adapter-A	971798	W-5/8 Anchor setting adapter-B	971803
Internal cone type		External cone type	

C. Large hole boring (rotation + striking)

- Center pin, core bit, core bit shank and guide plate



(1) Center pin (Do not use bit with outer diameter of 25 mm (31/32") and 29 mm (1-5/32"))

Center pin (A)	Core bit (outer diameter) 32, 35, 38 mm (1-1/4", 1-3/8", 1-1/2")	Code No. 982684
Center pin (B)	Core bit (outer diameter) 45, 50 mm (1-25/32", 2")	Code No. 982685

(2) Guide plate

Core bit (outer diameter) (mm)	Code No.	Core bit (outer diameter) (mm)	Code No.
32 (1-1/4")	982686	50 (2")	982690
35 (1-3/8")	982687		
38 (1-1/2")	982688		
45 (1-25/32")	982689		

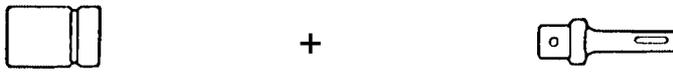
(3) Core bit with guide plate (the guide plate is not supplied with 25 mm (31/32") and 29 mm (1-5/32") outer diameter core bits.)

Outer diameter (mm)	Code No.	Outer diameter (mm)	Code No.
25 (31/32")	982672	45 (1-25/32")	982677
29 (1-5/32")	982673	50 (2")	982678
32 (1-1/4")	982674		
35 (1-3/8")	982675		
38 (1-1/2")	982676		

(4) Core bit shank (SDS-plus shank)

Core bit shank (A)	Core bit (outer diameter) 25 – 38 mm (31/32" – 1-1/2")	Overall length 105 mm (4-1/8")	Code No. 303625
		Overall length 300 mm (11-52/64")	Code No. 303626
Core bit shank (B)	Core bit (outer diameter) 45 – 50 mm (1-25/32" – 2")	Overall length 300 mm (11-52/64")	Code No. 303627

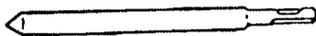
D. Bolt placing operations with chemical anchor (rotation + striking)



(Standard sockets available on the market) 12.7 mm (1/2") Chemical anchor adapter (SDS-plus shank)
19 mm (3/4") Chemical anchor adapter (SDS-plus shank)

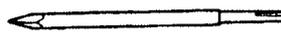
Part name	Code No.
12.7 mm (1/2") Chemical anchor adapter	303044
19 mm (3/4") Chemical anchor adapter	303045

E. Crushing operations (striking only)



Bull point (round type)
(SDS-plus shank)

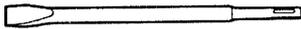
Code No. 303046



Square bull point
(SDS-plus shank)

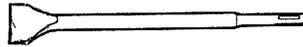
Code No. 316656

F. Groove digging and edging (striking only)



Cold chisel
(SDS-plus shank)

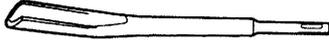
Code No. 316657



Cutter
(SDS-plus shank)

Code No. 316658

G. Grooving (striking only)



Grooving chisel
(SDS-plus shank)

Code No. 316659

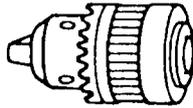
H. Drilling holes and driving screws (rotation only)

- Drill chuck, chuck dapter (G), special screw and chuck wrench



Special screw

+



13 mm (1/2") Drill chuck
(13VLR type)

+



Chuck adapter (G)
(SDS-plus shank)



Chuck wrench

(NOTE)

If the tool is to be used for loosening screws, open the three jaws of the drill chuck and securely fix the drill chuck to chuck adapter (G) with the special screw (a left-hand threaded M6 screw) when mounting the drill chuck onto chuck adapter (G).

	Part name	Code No.
	Drill chuck adapter set (SDS-plus) (includes a, b, c)	303820
a.	Chuck adapter (G) for SDS-plus shank system	303623
b.	13 mm (1/2") Drill chuck 13VLR (with chuck wrench)	950275
c.	Special screw (M6 left-hand threaded)	981122

(1) Cross-recessed head (Phillips) bit

[Overall length: 70 mm]

(For use with cross-recessed head (Phillips) screw)



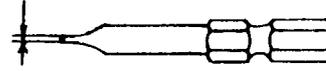
Stamped bit No.

Bit No.	Code No.	Applicable screw dia. (mm)
No. 2	955654	3 – 5
No. 3	955655	6 – 8

(2) Slotted-head (minus) bit

[Overall length: 50 mm]

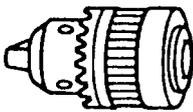
(For use with slotted-head (minus) screw)



Tip thickness

Bit tip thickness	Code No.	Applicable screw dia. (mm)
0.8	955658	4
1	955673	5 – 6

I. Drilling hole (rotation only) ... for drilling holes in steel and wood

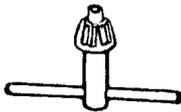


Drill chuck
(13VLA)

+



Chuck adapter (D)
(SDS-plus shank)



Chuck wrench

(NOTE)

The 13VLA drill chuck and chuck adapter (D) cannot be used for reverse rotation. If reverse rotation is to be used for loosening screws, use the plus bit (bit No. 2) described below by attaching it directly to chuck adapter (D).

Part name	Code No.
Chuck adapter (D) (for SDS-plus shank type)	303624
13 mm (1/2") Drill chuck 13VLA (with chuck wrench)	950272

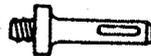
J. Drilling screws (rotation only)

- Plus driver bit [overall length: 25 mm] (for cross-recessed head screws)



Bit No.

+



Chuck adapter (D)
(SDS-plus shank)

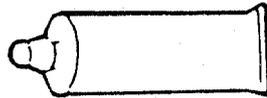
Bit No.	Screw size	Code No.
No. 2	3 – 5 mm	971511Z
No. 3	6 – 8 mm	971512Z

K. Grease for electric impact drill

- Containing 500 g (17.64 oz): Code No. 980927

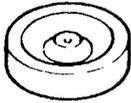


- Containing 30 g (1.06 oz): Code No. 981840
- 70 g (2.5 oz): Code No. 308471



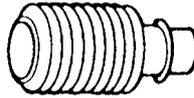
L. Dust cup, dust collector (B)

Dust cup



Code No. 971787

Dust collector (B) ass'y



Code No. 306885

6. PRACTICAL DATA

6-1. Drilling Speed

Drilling speed depends on the operating conditions. The test results shown in Fig. 1 are based on actual tests at the factory and should be used as a reference only.

The drill bits which used in the test are the Hitachi genuine SDS-plus shank bits.

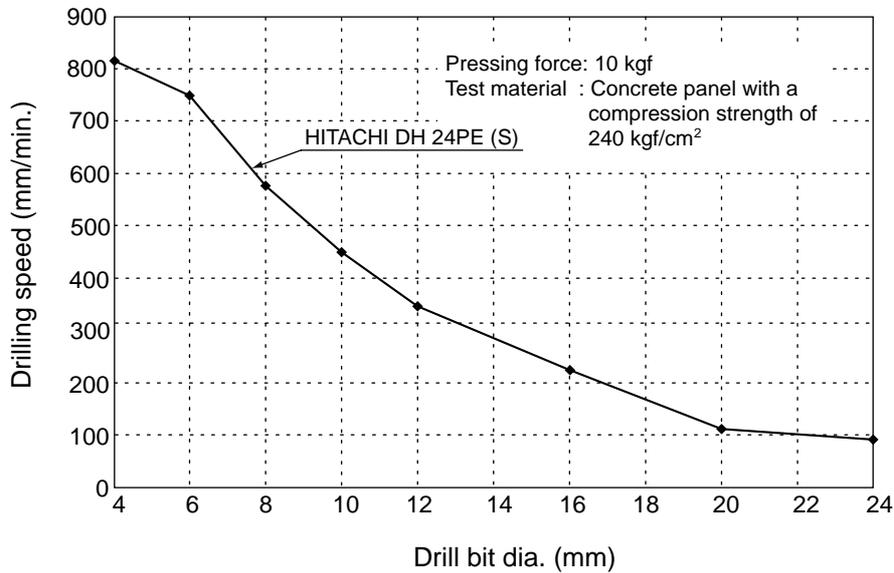


Fig. 1 Drilling speed comparisons (downward drilling)

6-2. Chiselling Performance

Chiselling performance depends on the operating conditions. The test results shown in Fig. 2 are based on actual tests at the factory, and should be used as a reference only.

[Test conditions]

Posture : Downward chiselling

Test material : Concrete panel with a compression strength of 240kgf/cm²

Bull point : Hitachi genuine SDS-plus bull points

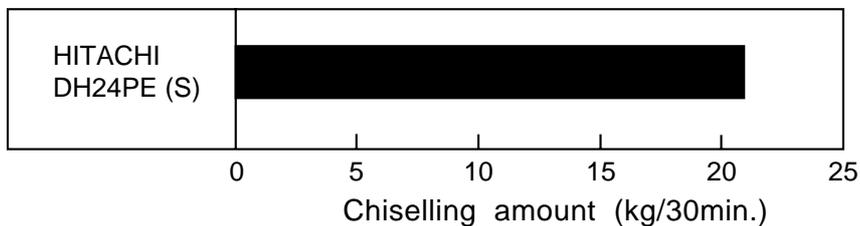


Fig. 2 Chiselling performance comparisons

7. PRECAUTIONS IN SALES PROMOTION

In the interest of promoting the safest and most efficient use of the Model DH 24PE (S) Hammer Drill by all of our customers, it is very important that at the time of sales the salesperson carefully ensures that the buyer seriously recognizes the importance of the contents of the Instruction Manual, and fully understands the meaning of the precautions listed on the Caution Plate attached to each tool.

7-1. Instruction Manual

Although every effort is made in each step of design, manufacture and inspection to provide protection against safety hazards, the dangers inherent in the use of any electric power tool cannot be completely eliminated. Accordingly, general precautions and suggestions for the use of electric power tools, and specific precautions and suggestions for the use of the Hammer Drill are listed in the Instruction Manual to enhance the safe, efficient use of the tool by the customer. Salespersons must be thoroughly familiar with the contents of the Instruction Manual to be able to offer appropriate guidance to the customer during sales promotion.

7-2. Caution Plate

The following basic safety precautions are listed on the Name Plate attached to the main body of each tool.

For the U.S.A. and Canada

WARNING

- To reduce the risk of injury, user must read and understand instruction manual.

AVERTISSEMENT

- Afin de reduire le risque de blessures, l'utilisateur doit lire et bien comprendre le mode d'emploi.

8.REFERENCE MATERIAL

8-1. Lubrication

It is not necessary to replenish the grease lubricant unless the tool is disassembled or there is grease leakage due to a defective seal. Special grease is used in the striking section. Should the striking section (within the gear cover) be disassembled, carefully remove the old grease from all parts and, on reassembly, inject 55 g (1.94 oz) of new grease into the gear cover. Be careful not to exceed the designated amount of grease. Excessive grease will reduce striking efficiency.

8-2. Tool Structure

- Transmission of rotation

Unlike conventional hammer drills, the armature shaft in the Model DH 24PE (S) is in parallel with the tool shaft - the same structure that is employed in most impact drills. This structure was adopted in order to make the Model DH 24PE (S) more compact for easier handling and operation. Thus, the appearance of the Model DH 24PE (S) is similar to that of an impact drill. The rotation of the armature is transmitted to the second shaft via the first gear, and causes it to rotate. The second pinion provided on the second shaft engages the second gear mounted on the outer circumference of the cylinder. The cylinder is coupled to the second gear by means of a slip mechanism, and they rotate together. The end of the cylinder also functions as the drill bit retainer. The cylinder is key-connected to the inserted drill bit by means of two key rails, and transmits rotation to the drill bit. A steel ball is used to prevent the bit from coming off.

- Piston reciprocating mechanism

In conventional hammer drills, a piston is caused to reciprocate by a connecting rod and crankshaft, and the crankshaft and the cylinder axes are at right angles to each other. Accordingly, the armature shaft and the cylinder axes are also at right angles to each other. In the Model DH 24PE (S), through adoption of a spiral drive system (a mechanism using a reciprocating bearing), a more compact design has been achieved by arranging the armature shaft in parallel with the cylinder axis. Referring to Fig. 3, the armature's rotation is transmitted to the second shaft via the first gear. The second shaft's rotation is then transmitted through a spline to the clutch, which engages with a reciprocating bearing and causes it to rotate. However, as illustrated, circular grooves on the inner race of the reciprocating bearing are positioned on an angle of inclination with relation to the second shaft. The rotation of the inner race and the shaft causes the angle of inclination to change regularly forward and back with relation to the second shaft, and produces a rocking motion in the outer race of the reciprocating bearing. Finally, a rod extending from the outer race of the reciprocating bearing is connected to the piston by a piston pin, and causes the reciprocating motion of the piston.

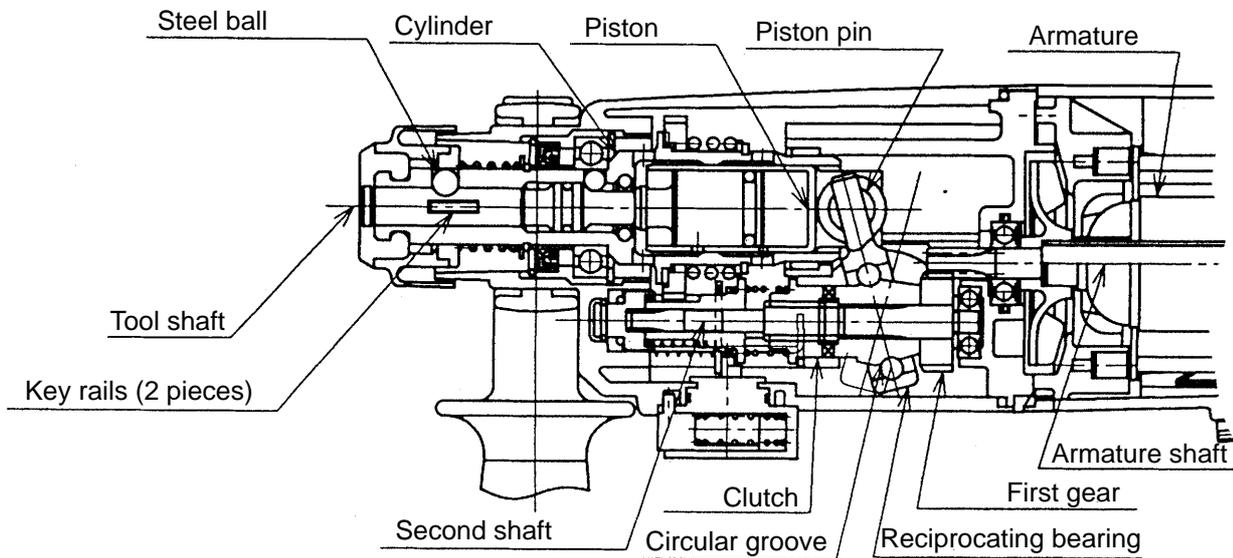


Fig. 3

- Striking function

The piston reciprocates within the cylinder to move the striker in the same manner as in conventional hammer drills. As the piston reciprocates, the changing air pressure inside the air chamber between the piston and the striker causes the striker to move and repeatedly strike against the end of the second hammer. At the same time, the changing air pressure within the air chamber which moves the striker also provides an "air cushion" which absorbs the impact of the striking action. As any air leakage from the air chamber weakens the air-cushion effect and reduces impact absorption, the O-ring (mounted on the striker) is extremely important to seal the air. Although a special rubber material is utilized in construction of the O-ring to make its effective service life as long as possible, wear cannot be fully avoided. Accordingly, it is recommended that the O-ring be replaced approximately once a year, depending on the frequency of usage of the tool.

- Idle striking prevention mechanism

The idle striking prevention mechanism in the Model DH 24PE (S) is different from that of conventional hammer drills. When the drill bit is lifted from the work surface on completion of drilling, the second hammer moves to the position indicated by the continuous lines in Fig. 4 and the protruding (lip) portion at the tip of the striker is gripped by the O-ring mounted on the inner wall of the cylinder. In this state, should the piston continue to move so that the small piston vent hole is blocked by the inner wall of the cylinder, the air in the air chamber will pass through the large piston vent hole and be released through the air-escape slot and large cylinder vent hole provided on the inner wall of the cylinder. Accordingly, there is no change in the air pressure within the air chamber, and movement of the striker (idle striking operation) is prevented. The gripping force of the O-ring on the striker is so small in comparison with the conventional mount system that practically no pressing force at all is required to restart the striking operation.

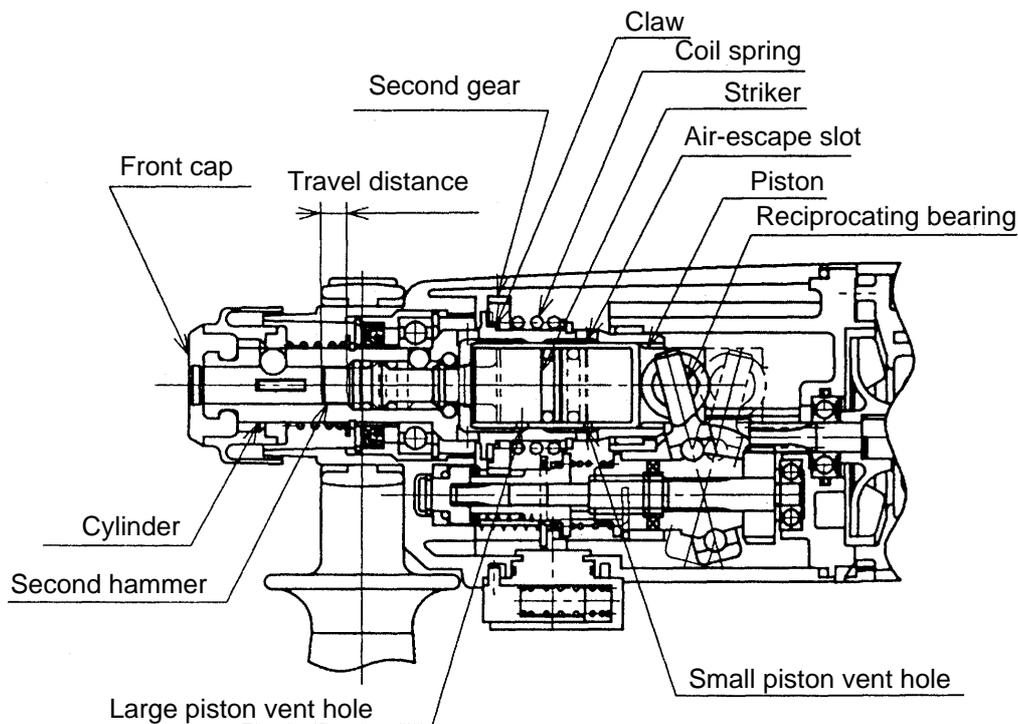


Fig. 4

- Slip mechanism

The slip mechanism in the Model DH 24PE (S) consists of a coil spring which applies a pre-set amount of pressure to ensure the interlocking of three claws provided on the flange of the cylinder (the final rotating shaft) and six matching claws provided on the face of the second gear, by which rotation is transmitted to the cylinder. The second gear is fitted to the cylinder with a certain amount of play. If an excessively large torque is applied to the tool shaft (cylinder), the force of the torque will exceed the pressure of the coil spring and cause the claws on the second gear to disengage from and ride over the claws on the cylinder so that the second gear idles and does not transmit rotation. Even if the drill bit comes in contact with a reinforcing bar within concrete, causing sudden excessive torque, the slip mechanism functions to prevent damage to the gears, and possible loss of control of the tool by the operator.

- Sealed and dustproof construction

The gear cover is totally enclosed by oil seals, O-rings and other devices to prevent leakage of lubricating grease, and to keep dust and dirt out of the internal mechanisms. The drill bit chuck portion is protected by a rubber front cap to keep out dust and chips which could cause improper fitting of the drill bit and/or other faulty operation of the chuck portion. The speed control switch is also a fully dust-proofed type to prevent dust and chips from entering the handle section and causing possible operational trouble or a break down of the insulation.

- Speed control

The Model DH 24PE (S) is equipped with a variable speed control switch which permits free change of the rotation speed and striking force. When drilling in fragile materials, pull the switch trigger gently for low rotation speed (striking force) to achieve optimum results.

8-3. "Three-Mode" Changeover Mechanism

The change lever of the Model DH 24PE (S) permits quick and easy changeover among the "rotation and striking", "rotation only" and "striking only" functions. Each function mode is explained below. When operating the change lever, be sure to continue pressing the pushing button.

(1) Rotation and striking (Fig. 5)

Adjust the change lever to "rotation and striking" (T marks). Armature rotation is transmitted to the first gear and second shaft, and then to the clutch via the spline of the second shaft. Claws on the end surface of the clutch engage with matching claws of the reciprocating bearing (A portion in the figure) to convert the rotation into reciprocating motion. Three claws on the tip of the second shaft engage with matching three claws of the pinion sleeve all the time, and the second shaft rotation is transmitted to the pinion sleeve. Then claws on the large-dia. portion of pinion sleeve engage with the second pinion (B portion in the figure), and the rotation is transmitted to the second gear and the cylinder.

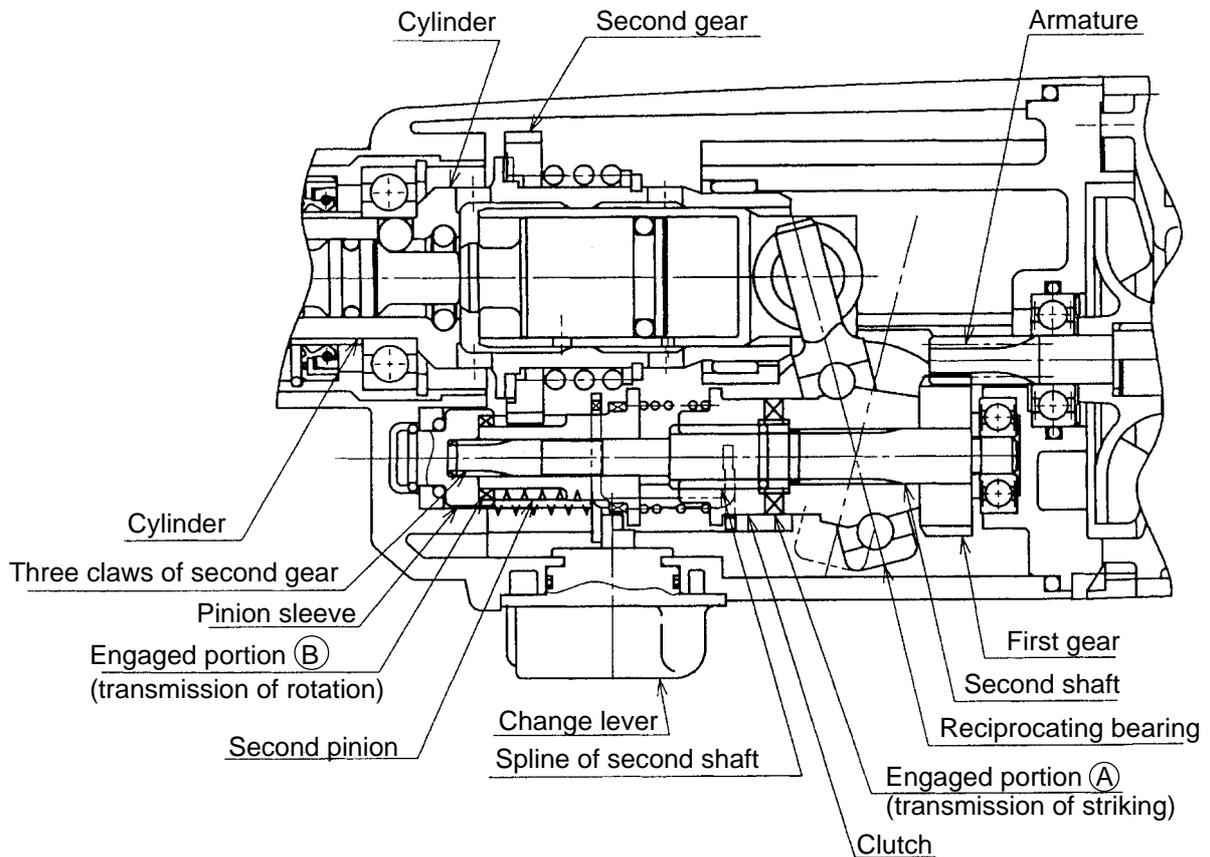


Fig. 5

(2) Rotation only (Fig. 6)

Adjust the change lever to "rotation only" (⚙️ mark). The lock plate is moved forward by the pin of the change lever, and the clutch is moved forward at the back end of the lock plate. Engagement between the clutch and the claws of the reciprocating bearing is released (Ⓐ portion in the figure). Thus no rotation is transmitted to the reciprocating bearing and striking is stopped. On the other hand, the pinion sleeve engages with the second pinion (Ⓑ portion in the figure), and so the rotation is transmitted to the pinion sleeve for "rotation only" function.

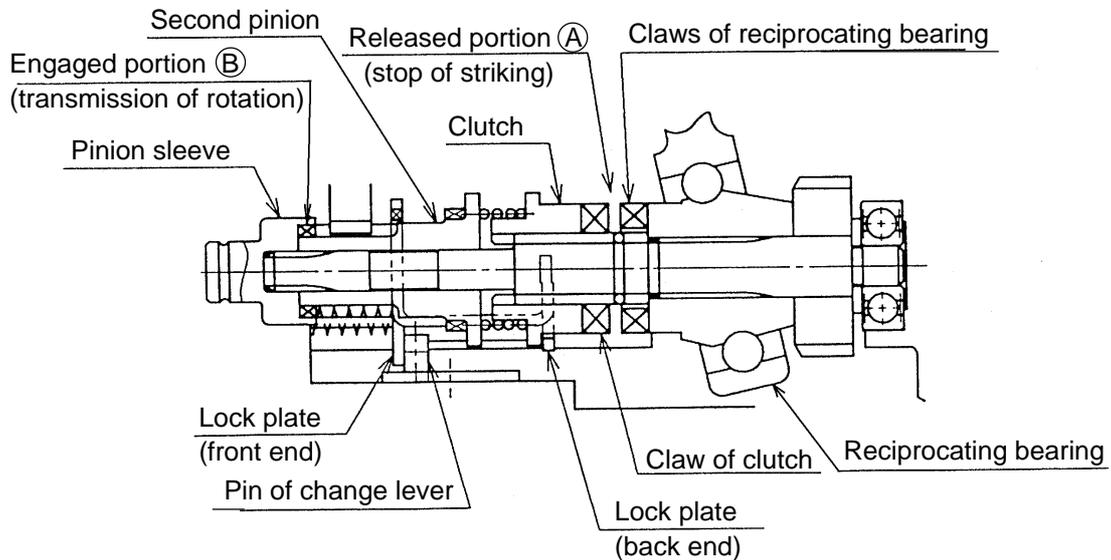


Fig. 6

(3) Striking only (Fig. 7)

Adjust the change lever to "striking only" (⚔️ mark). The second pinion is moved to the motor side by the pin of the change lever. Engagement between the pinion sleeve and the second pinion is released and no rotation is transmitted (Ⓑ portion in the figure). The lock plate is moved to the motor side by spring (B) and engaged with the locking claw of the second pinion to lock the cylinder rotation (Ⓒ portion in the figure). On the other hand, the clutch engages with the reciprocating bearing for "striking only" function (Ⓐ portion in the figure).

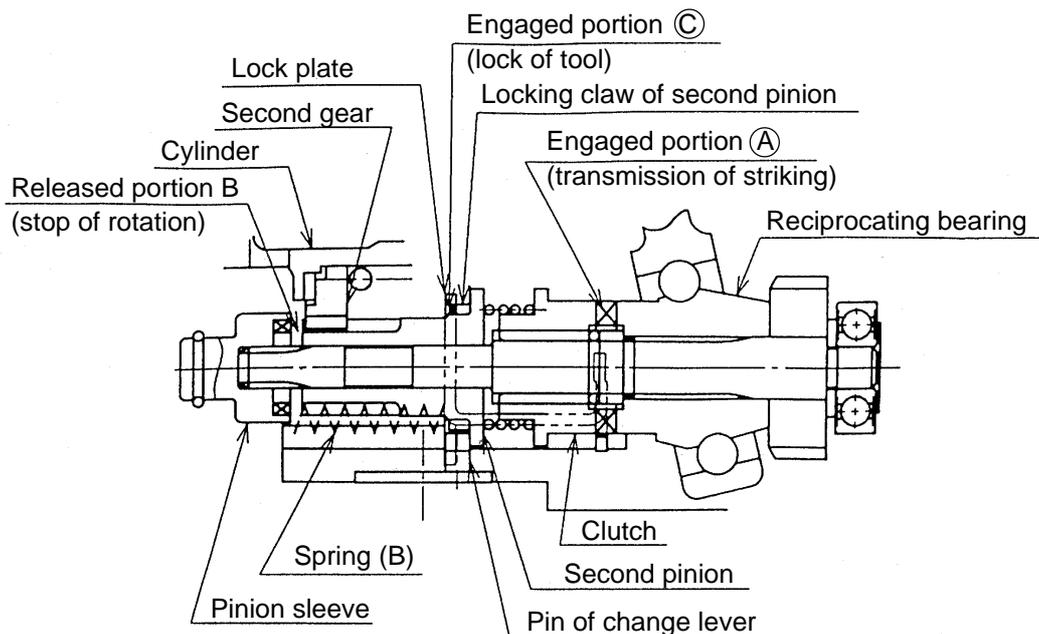


Fig. 7

(4) Neutral (Fig. 8)

The Model DH 24PE (S) has a neutral mode used for positioning a tool such as a flat chisel. Adjust the change lever to a position halfway between "striking only" (T mark) and "rotation and striking" (T with diagonal lines marks). Engagement between the pinion sleeve and the second pinion (B portion in the figure), and between the lock plate and the locking claw of the second pinion (C portion in the figure) is released and the cylinder rotates freely. Simply turn the grip to adjust the tool to the desired position.

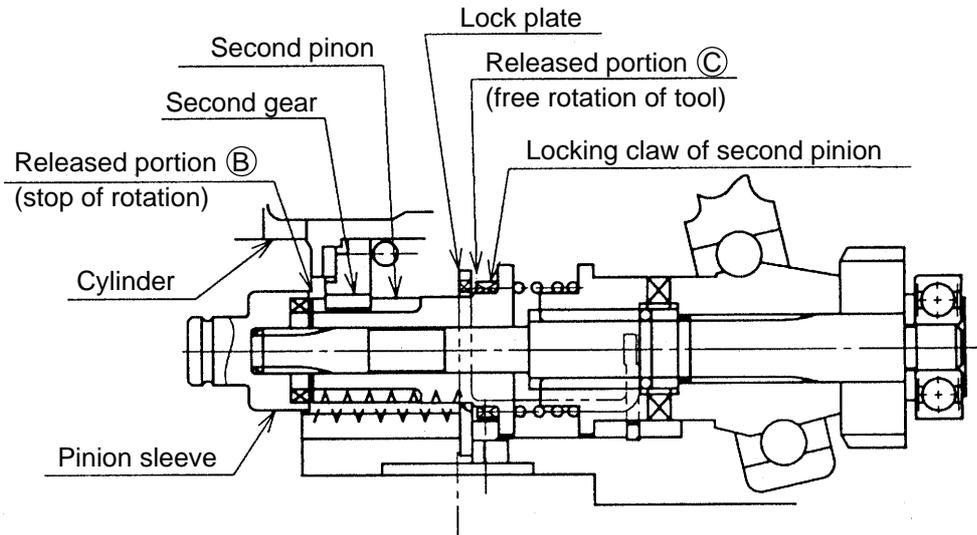


Fig. 8

8-4. Drill Bits

The chuck section is designed exclusively for the popular and widely available SDS-plus shank bits, as shown in Fig. 9. Rotating torque is transmitted to the drill bit by two key rails provided in the tool holding section. A steel ball is used to prevent the bit from coming off. Compared with a conventional design that uses two needle rollers to both transmit rotating torque and prevent the bit from coming off, this new design reduces damage to the shank of the drill bit and extends the service life of the chuck section.

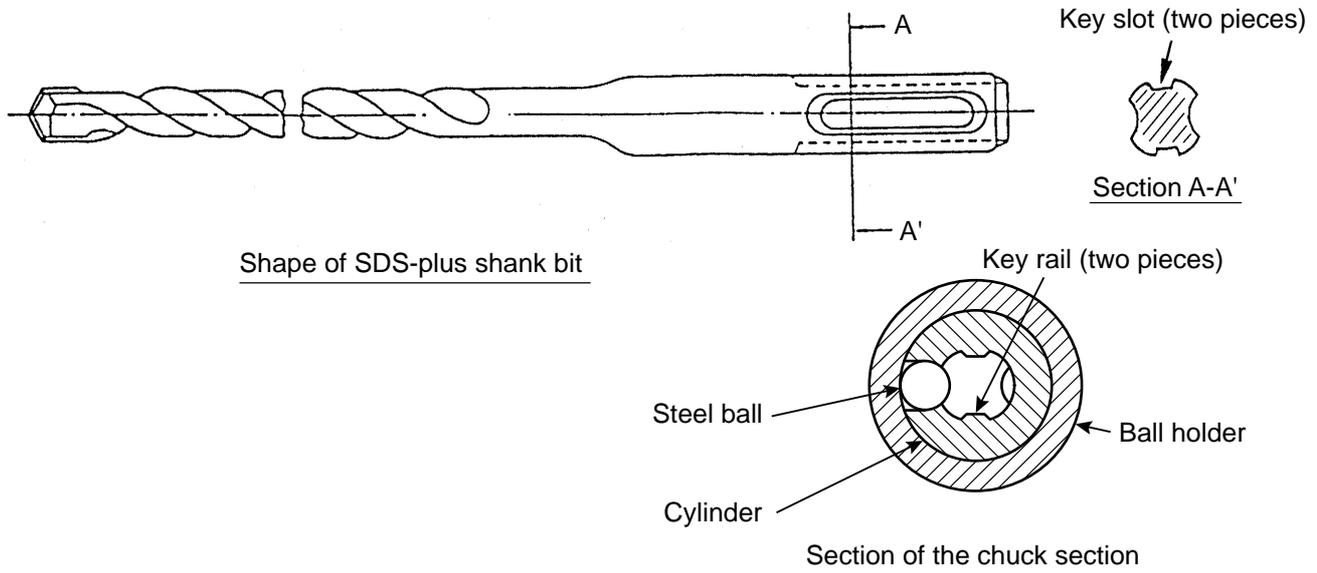


Fig. 9

The service life of a drill bit with a diameter of 8 mm is approximately 300 holes when drilling into concrete to a depth of 30 mm. If reground before the end of its service life, the drill bit will continue to provide efficient drilling. Figure 10 shows the regrinding angle.

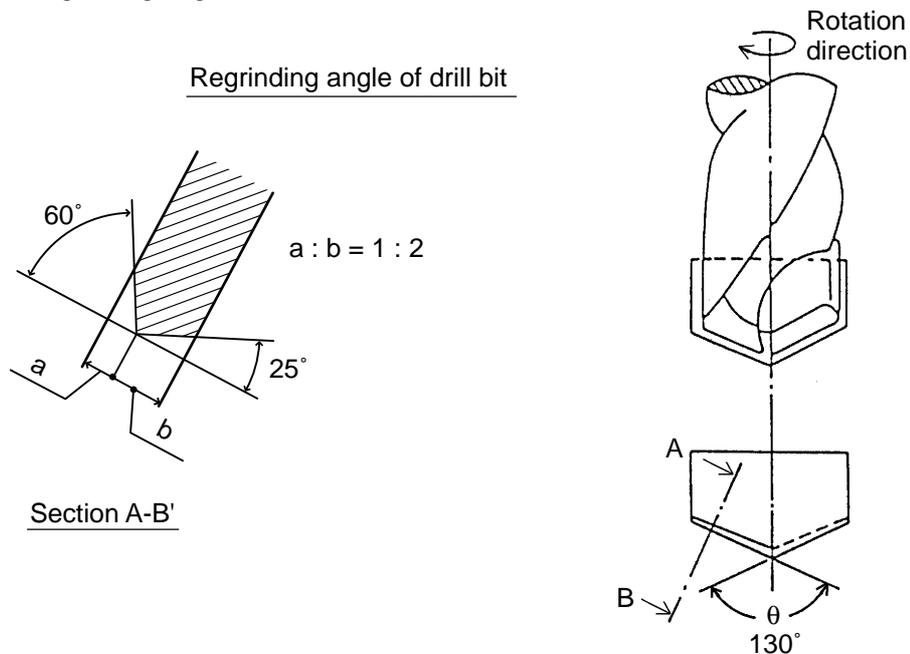


Fig. 10

8-5. Chuck Section

Figure 11 shows the construction of the chuck section.

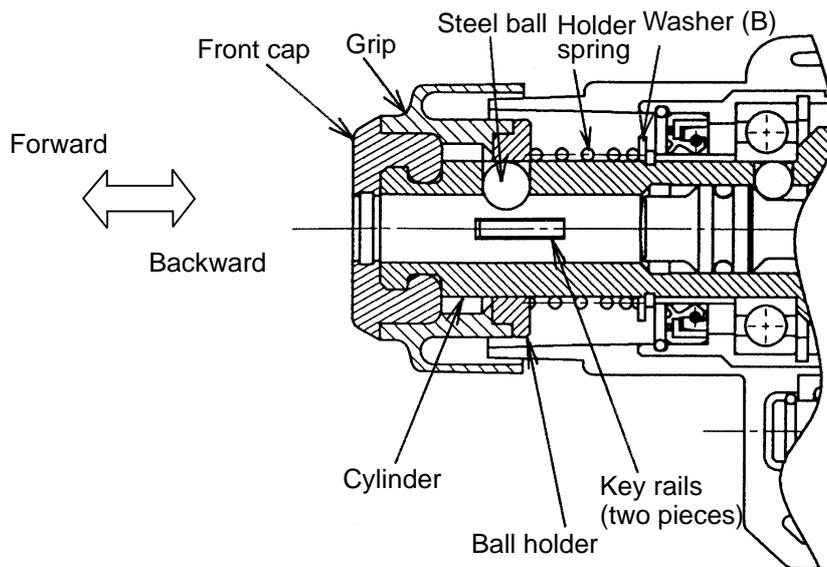


Fig. 11

The opening where the drill bit is inserted is covered with a front cap (rubber) to prevent dust from entering inside. When the drill bit is inserted, the steel ball fits in to the matching groove on the drill bit to lock it in place and prevent it from coming off. Two key rails transmit rotating torque to the drill bit. The drill bit can be released by simply pulling the grip back. The grip is held forward by a holder spring. To mount a drill bit, pull the grip back to compress the holder spring. The steel ball then moves outward. While turning the drill bit, push it until it makes contact and is fully inserted. Then release the grip so that it moves forward and fixes the drill bit. To remove the drill bit, simply pull the grip back fully and pull the drill bit out.

8-6. Dust Collector (B)

When drilling holes overhead, dust collector (B) can be mounted on the Model DH 24PE (S) to prevent dust and chips from falling downward. Dust collector (B) is intended solely for use when drilling holes in concrete, and cannot be used for drilling holes in steel or wood. It is designed for use with drill bits with overall lengths of 110 mm, 160 mm or 166 mm, and cannot be used with any longer bits. When using a drill bit with an overall length of 166 mm with dust collector (B), drilling up to a depth of approximately 72 mm is possible. When using dust collector (B), ensure it is securely fastened to the grip on the main body with socket adapter (B). Although the socket and socket adapter (B) rotate together with the tool shank, there is a steel ball between the outer race and the socket which serves as a ball bearing. Should the dust cover be forced against the concrete surface, it will not rotate even though the tool shank continues to rotate. Should the tool be operated when the dust cover is not being held against a concrete surface, inertia may cause dust collector (B) to become disconnected from the grip. Accordingly, caution the customer to press dust collector (B) and drill bit firmly against the concrete surface before turning on the switch to start drilling. When dust collector (B) is used, almost no dust and chips are scattered about. However, since the chips and dust remaining in the collector may scatter after completion of the drilling operation, the customer should be advised to always wear protective glasses. When dust collector (B) is disassembled for repair or maintenance, be very careful to prevent oil or grease from adhering to the steel balls. Grease or oil on the steel balls may cause concrete dust to enter the unit and cause defective rotation.

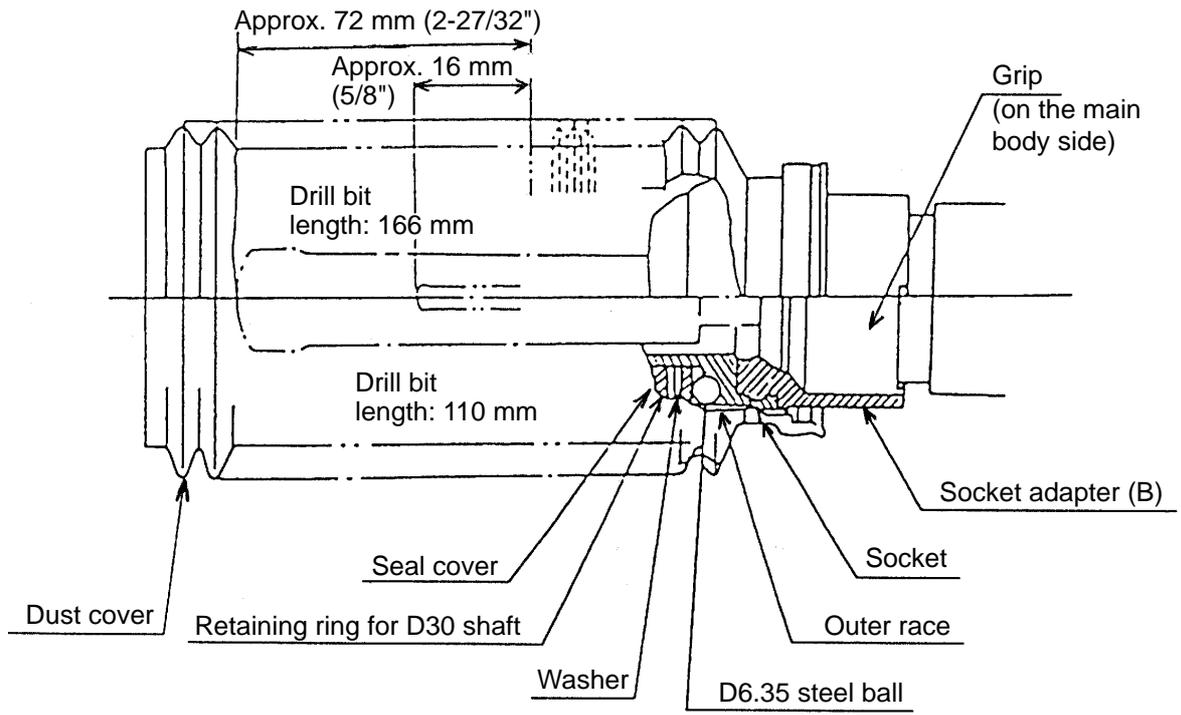


Fig. 12 Dust collector (B) structure

9. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

The **[BOLD]** numbers in the descriptions below correspond to the item numbers in the Parts List and exploded assembly diagram.

9-1. Disassembly

(1) Disassembly of the striking mechanism section

- Push the Second Hammer **[116]** in the main body with a drill bit or screwdriver to release the striker from O-Ring (B) **[26]**.
- Pressing the Pushing Button **[110]**, move the Change Lever **[107]** to the "striking only" mode (T mark). (Be sure to keep pressing the Pushing Button **[110]** when operating the Change Lever **[107]**.)
- Loosen the four Tapping Screws (W/Flange) D5 x 35 **[8]**, and remove the Gear Cover **[104]**. The Inner Cover **[33]** and the Housing **[54]** are loosely fitted together. Attempting to pull them out first could cause the Armature Ass'y 110 V-115V **[47]** to be pulled out at the same time, causing damage to the Carbon Brushes **[64]**.
- Remove Springs (B) **[105]** from the rails in the Gear Cover **[104]** as shown in Fig. 13.
- Pull out the Second Pinion **[120]**, the Clutch Spring **[121]**, the Clutch **[122]**, and the Lock Plate **[119]** (these parts are sandwiched by means of the Lock Plate **[119]** as a unit as shown in Fig. 14) from the end of the second shaft of the Gear.Shaft Set **[117]**. Turn the Reciprocating Bearing **[123]** so that the Piston **[30]** is moved to its maximum upper position (inner cover side). The arm of the Reciprocating Bearing **[123]** can then be disconnected from the Piston Pin **[31]**, and the Gear Shaft Set **[117]** and the components mounted on the second shaft can be removed from the Inner Cover **[33]** as a unit.
- Remove the first gear of the Gear.Shaft Set **[117]** from the second shaft with a bearing puller (special repair tool J-30 bearing puller ass'y, Code No. 970804, is recommended). Then take off the Reciprocating Bearing **[123]**. At this time, take care not to damage the end surface of the second shaft because the first gear is press-fitted in alignment with the 9 mm diameter end surface of the second shaft.

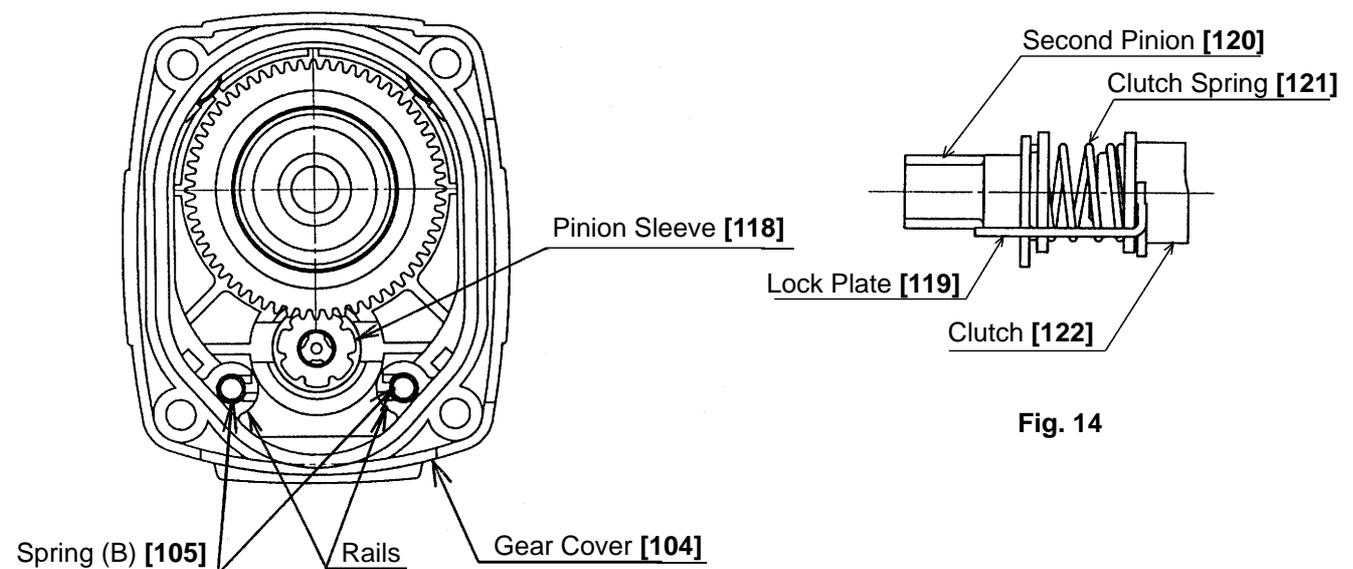


Fig. 13

Fig. 14

(2) Disassembly of the change lever

- As shown in Fig. 15, pressing the Pushing Button [110] hard, turn the Change Lever [107] 45° counterclockwise from the "striking only" position (T mark). Pry out the Change Lever [107] at this position.

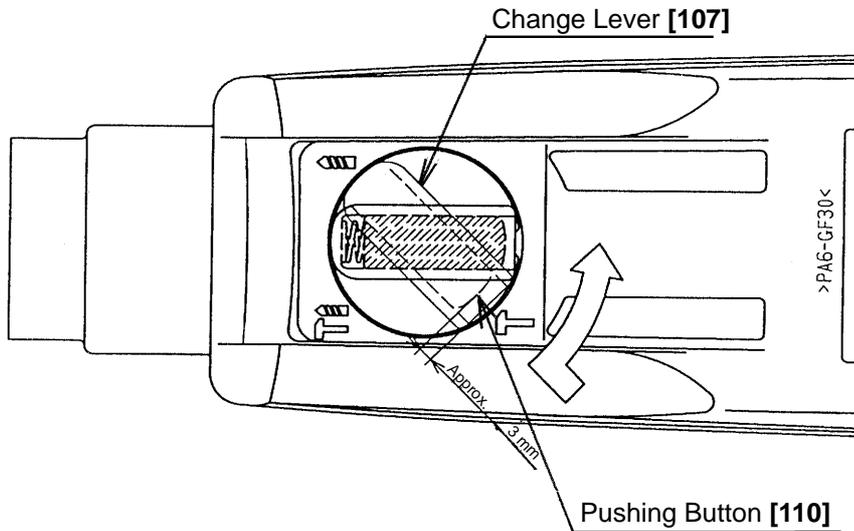


Fig. 15

(3) Disassembly of the chuck section

As shown in Fig. 16, slide the Grip [101] in the direction indicated by the arrow, and remove the Front Cap [1]. The Grip [101], the Ball Holder [102] inside the Grip, the Holder Spring [4], Washer (B) [5] and the Steel Ball D7.0 [18] can then be removed from the Cylinder [111].

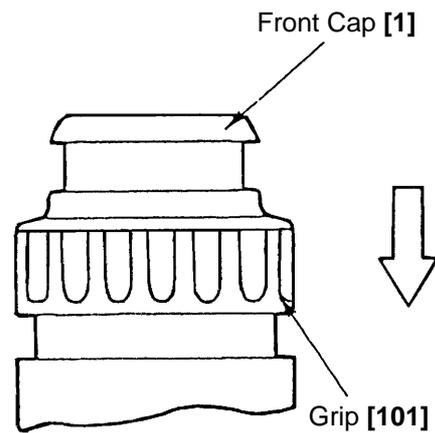


Fig. 16

(4) Disassembly of the cylinder, second gear (slip mechanism section) and related parts

Take the Inner Cover [33] off of the Gear Cover [104], and remove the entire chuck section. Extract the Retaining Ring for D20 Shaft [6]. (For easy removal of this retaining ring, use of special repair tool J-200 snap ring pliers [Code No. 970976] is recommended.) Then, turn the Gear Cover [104], upright and use a hand press to extract the Cylinder [111] from the Gear Cover [104]. The Sleeve [15] can then be extracted from the Cylinder [111]. At this time, be very careful not to lose the three Steel Balls D5.556 [19]. Remove the Retaining Ring D30 [115] from the upper part of the Cylinder [111]. The Second Gear [112], Spring (A) [113] and Washer (A) [114] can then be removed from the Cylinder [111]. Next, extract the O-Ring (I.D. 10.5) [27A] from the inner part of the Cylinder [111], and the Second Hammer [116] can be extracted from the Cylinder [111]. (For easy extraction of this O-Ring (I.D. 10.5) [27A], fit a special repair tool J-201 spring hook [Code No. 970977] onto the outer circumference of the O-Ring (I.D. 10.5) [27A], and pull it out.) As the O-Ring (I.D. 10.5) [27A] is employed to prevent idle striking, please advise customers to replace it with a new one whenever it is disassembled.

- Extract the Retaining Ring for D37 Hole [17], turn the Gear Cover [104] so that its tip portion is upward, and extract the Ball Bearing 6904CM [16] from the gear cover with a hand press. Pinch the bend of the Retaining Ring [103] with a pair of long-nose pliers in the arrow direction as shown in Fig. 17. Catch the loosened Retaining Ring [103] with the spring hook H-75 [J-201] and pull it out.
- Turn the Gear Cover [104] over and extract the Oil Seal [14] from the Gear Cover [104] with a hand press. Ensure that the Retaining Ring [103] and the Oil Seal [14] are replaced with new ones whenever they are disassembled.

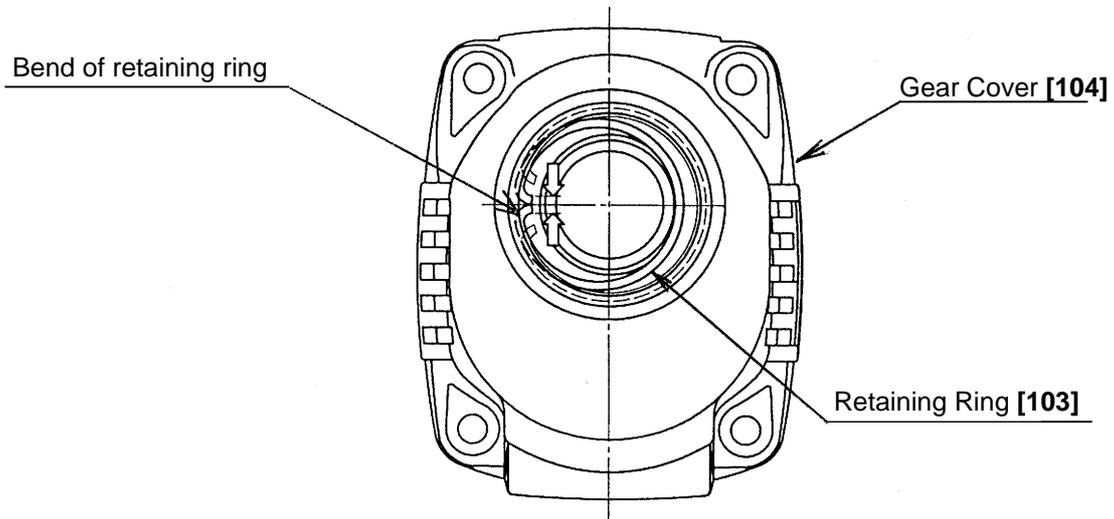


Fig. 17

- Pinch the Pinion Sleeve [118] with the pinion sleeve puller (J-302) and fix the pinion sleeve puller to a vise. Pull the Gear Cover [104] to remove the Pinion Sleeve [118] from the gear cover (Fig. 18).

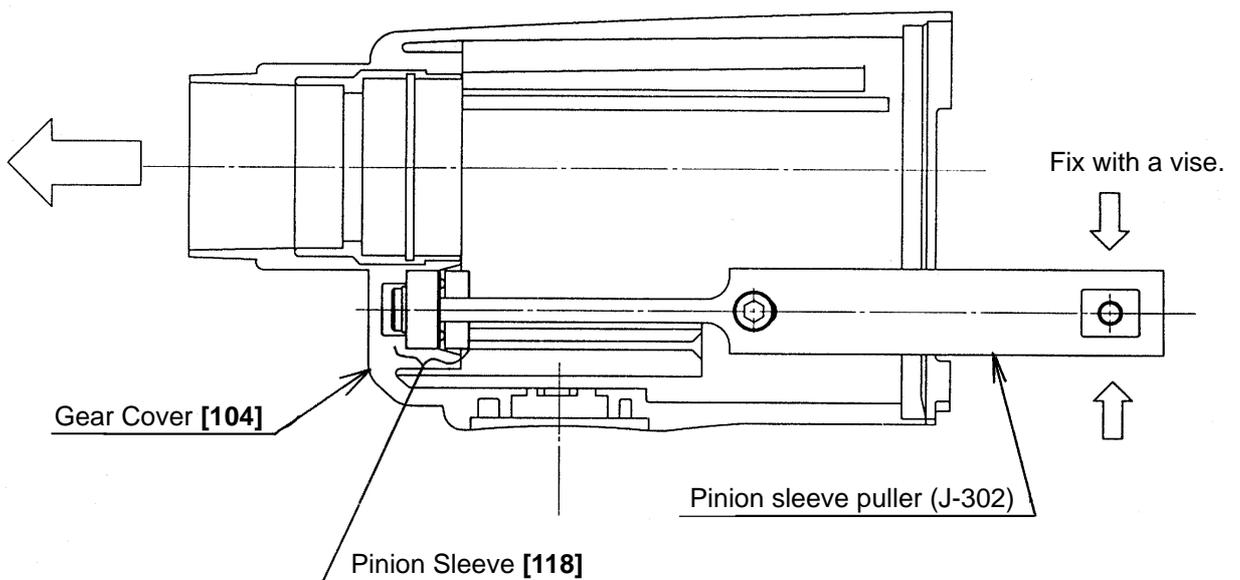


Fig. 18

- Use of special repair tools

- Snap ring pliers [J-200] (See Fig. 19.)

Used to remove the Retaining Ring for D20 Shaft [6] which fixes Cylinder [111] at the tip end of the Gear Cover [104].

- Spring hook [J-201] (See Fig. 20.)

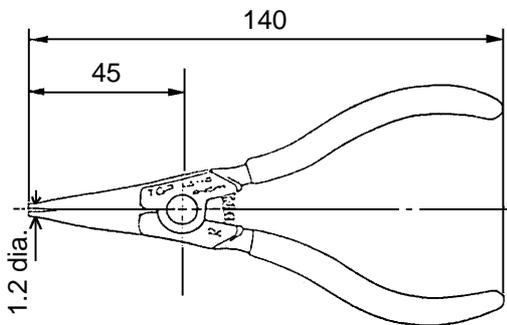
Used to extract the O-Ring (I.D. 10.5) [27A] inserted at the inner part of the Cylinder [111] which is designed to catch and grip the striker to prevent idle hammering. As shown in Fig. 22, fit the spring hook [J-201] onto the O-ring from its outer circumference, and pull it out.

Used to remove the retaining ring from the tip end of the gear cover. See "9-1. Disassembly - (4)".

- Pinion sleeve puller [J-302] (See Fig. 21.)

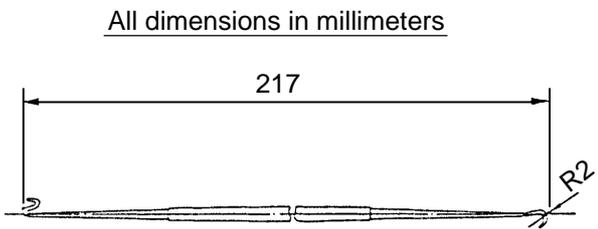
Used to remove the Pinion Sleeve [118] which is press-fitted at the inner part of the Gear Cover [104].

Adjust with the adjuster turning so that the claws of the pinion sleeve puller are caught in the groove of the Pinion Sleeve [118] as shown in Fig. 23.



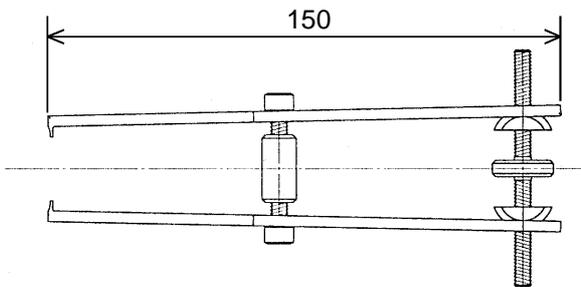
(1) Snap ring pliers [J-200]
Code No. 970976

Fig. 19



(2) Spring hook [J-201]
Code No. 970977

Fig. 20



(3) Pinion sleeve puller [J-302]

Fig. 21

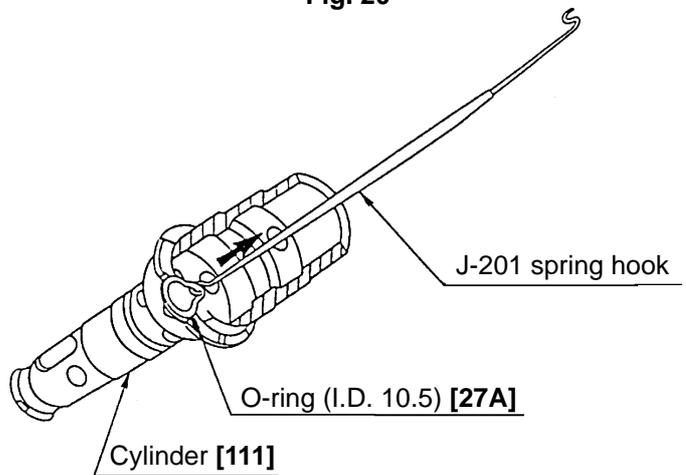


Fig. 22

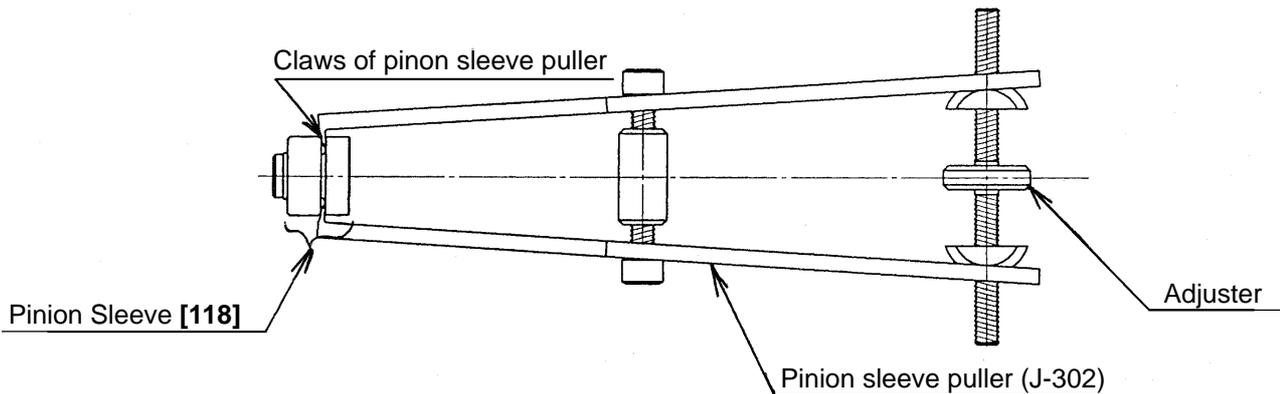


Fig. 23

9-2. Reassembly

Perform reassembly in the reverse order of disassembly while observing the given precautions and taking care of the following points.

(1) To make reassembly easier, coat the Steel Balls [18], [19] with grease.

(2) Reassembly of the Change Lever [107]

Press the Pushing Button [110] deeply into the hole of the Change Lever [107]. Adjust the Change Lever [107] to the position shown in Fig. 24 of the Gear Cover [104] and press it hard. Then move the change lever to the "striking only" position (T mark).

- If the Change Lever [107] is stiff, apply grease No. 29 (Code No. 930035, is recommended) to the O-ring and claws of the change lever.

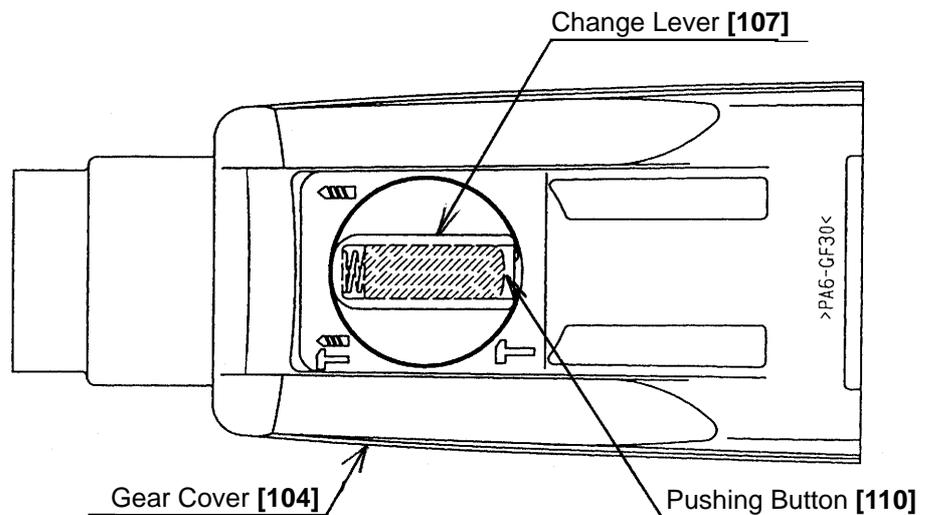


Fig. 24

(3) Reassembly of the first gear

Press-fit the first gear of the Gear.Shaft Set [117] aligning it with the 9-mm diameter end surface of the second shaft of the Gear.Shaft Set [117]. After press-fitting the first gear on the second shaft, check that the inner ring of the Reciprocating Bearing [123] turns smoothly.

(4) Reassembly of the Oil Seal [14]

Prior to reassembly, apply grease to the inner circumference of the Oil Seal [14]. However, do not apply grease to its outer circumference. Also, when press-fitting the Oil Seal [14], ensure that it is straight and level. After mounting the Oil Seal [14], mount the Retaining Ring [103] to prevent the Oil Seal [14] from coming off.

(5) Reassembly of the Gear Cover [104]

After reassembly as shown in Fig. 25, ensure that the Change Lever [107] is adjusted to the "striking only" position. Engage the claws of the Clutch [122] and the Reciprocating Bearing [123] each other. Align the wing portion of the Lock Plate [119] horizontally and reinstall the Gear Cover [104] so that the wing portion of the lock plate is contained in the rail inside of the gear cover. When the second shaft contacts the Pinion Sleeve [118] inside the gear cover, move the Change Lever [107] to the "rotation and striking" mode and rotate the grip. Then the second shaft and the Pinion Sleeve [118] are engaged and the end surface of the Gear Cover [104] contacts that of the Housing [54]. At this time, rotate the grip to check that the rotation of the Cylinder [111] is transmitted to the armature shaft.

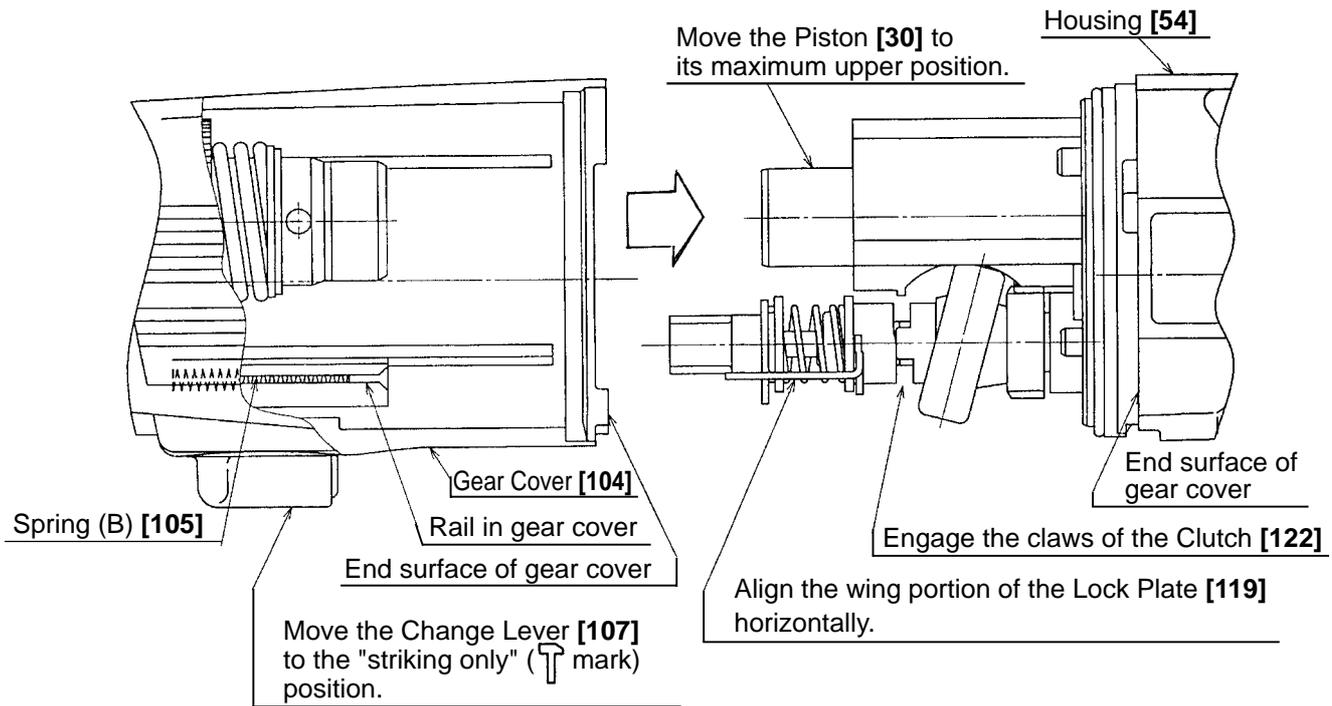


Fig. 25

9-3. Lubrication

Apply special grease (N.P.C FG-6A, Code No. 980927, is recommended.) to the inner and outer circumferences of the Piston Pin [31], and the Piston [30], O-Ring (A) [29] mounted on the Striker [28], O-Ring (B) [26] mounted on the Second Hammer [116], the Reciprocating Bearing [123], the Reciprocating Bearing [123] mounting portion and the Second Pinion [120] mounting portion of the second shaft of the Gear.Shaft Set [117], the O-Ring (I.D. 10.5) [27A] and the clutch-claw portions of the Cylinder [111], the end surfaces of the Clutch Spring [121], the inner circumferences of the metal inside the Inner Cover [33], the inner circumference of the Oil Seal [14] and the flange of the Clutch [122]. Also, without fail, insert 55 g (1.94 oz) of special grease inside the Gear Cover [104].

9-4. Tightening Torque

- Tapping Screws (W/Flange) D4 [58], [68] 2.0 ± 0.5 N.m (20 ± 5 kgf·cm, 17.4 ± 4.3 in-lbs)
- Tapping Screws (W/Flange) D5 x 35 [8] 2.9 ± 0.5 N.m (30 ± 5 kgf·cm, 26.0 ± 4.3 in-lbs)

9-5. Wiring Diagram

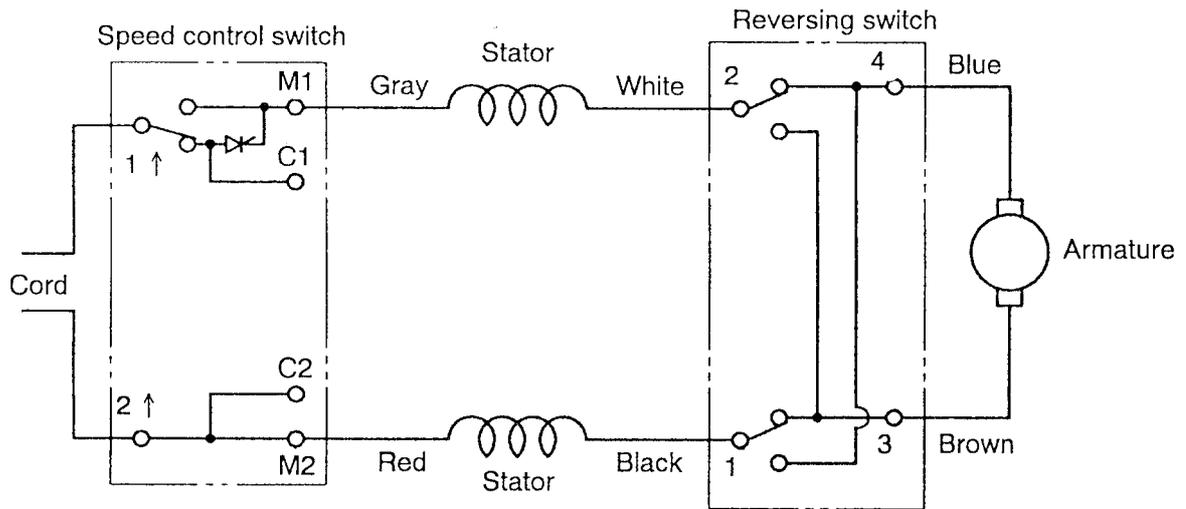


Fig. 26

9-6. Internal Wire Arrangement and Wiring Work

A. Internal wire arrangement

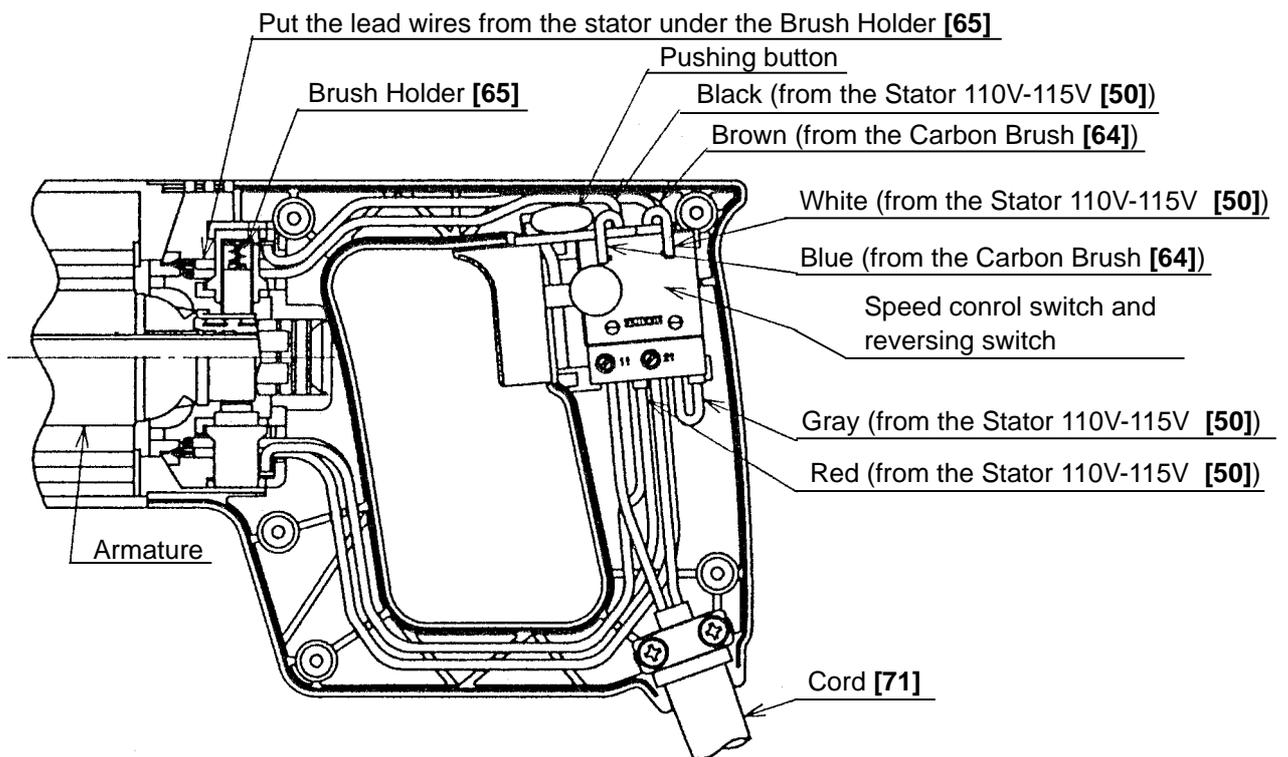


Fig. 27 Schematic diagram

B. Additional wiring work

General internal wiring can be accomplished by referring to paragraphs 9-5 and 9-6. The following are special instructions for switch connection.

(1) Wiring of reversing switch

Insert the lead wire (black) coming from the stator into the terminal (1) of the reversing switch, and the lead wire (white) into the terminal (2) as shown in Fig. 28. Insert the lead wire (brown) coming from the carbon brush into the terminal (3) and the lead wire (blue) into the terminal (4). After the insertion, pull each lead wire slightly to check the lead wires do not come off. To disconnect the lead wires, insert a small slotted-head screwdriver into the windows near the terminals and pull out the lead wires.

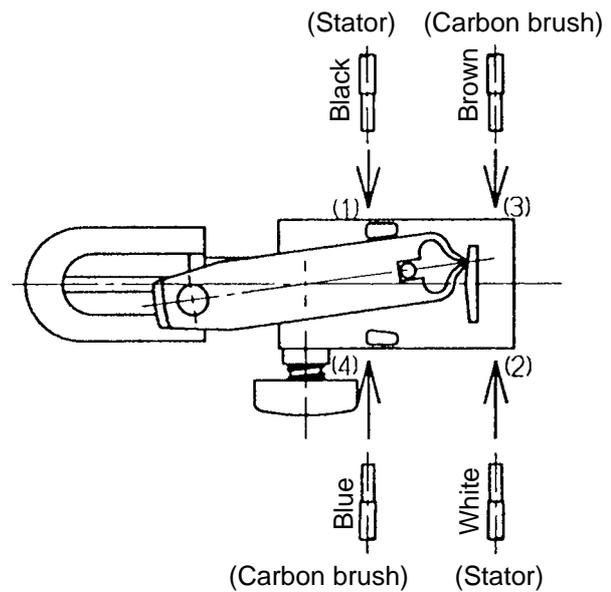


Fig. 28

(2) Wiring of speed control switch

Insert each cord into the terminal 1↑ and terminal 2↑ of the speed control switch as shown in Fig. 29 and tighten the screw (tightening torque: $0.6 \pm 0.2 \text{ N}\cdot\text{m}$ ($6 \pm 2 \text{ kgf}\cdot\text{cm}$, $5.2 \pm 1.7 \text{ in}\cdot\text{lbs}$)). Insert the lead wire (gray) coming from the stator into the terminal M1 and the lead wire (red) into the terminal M2. After the insertion, pull each lead wire slightly to check the lead wires do not come off. To disconnect the lead wires, insert a small flat-blade screwdriver into the windows near the lead wires and pull out the lead wires.

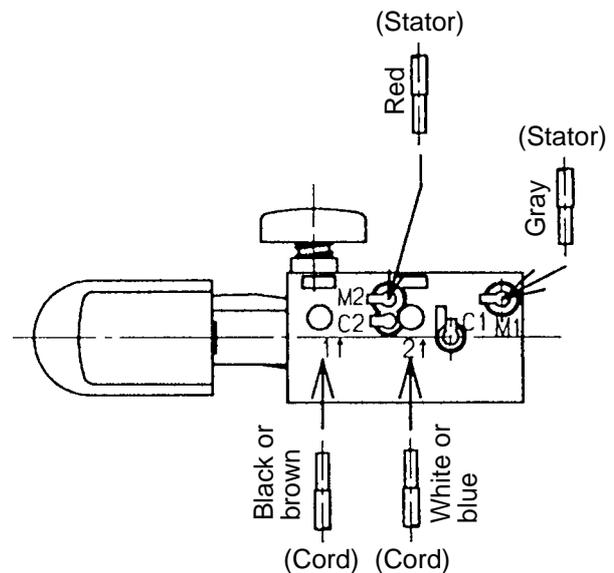


Fig. 29

9-7. Insulation Tests

On completion of reassembly after repair, measure the insulation resistance and conduct the dielectric strength test.

Insulation resistance: $7 \text{ M}\Omega$ or more with DC 500 V megohm tester

Dielectric strength: AC 2,500 V/1 minute, with no abnormalities 110 V – 115 V

9-8. No-Load Current Value

After no-load operation for 30 minutes, the no-load current values should be as follows.

Voltage (V)	110	115
Current (A) Max.	3.0	3.0

10. STANDARD REPAIR TIME (UNIT) SCHEDULES

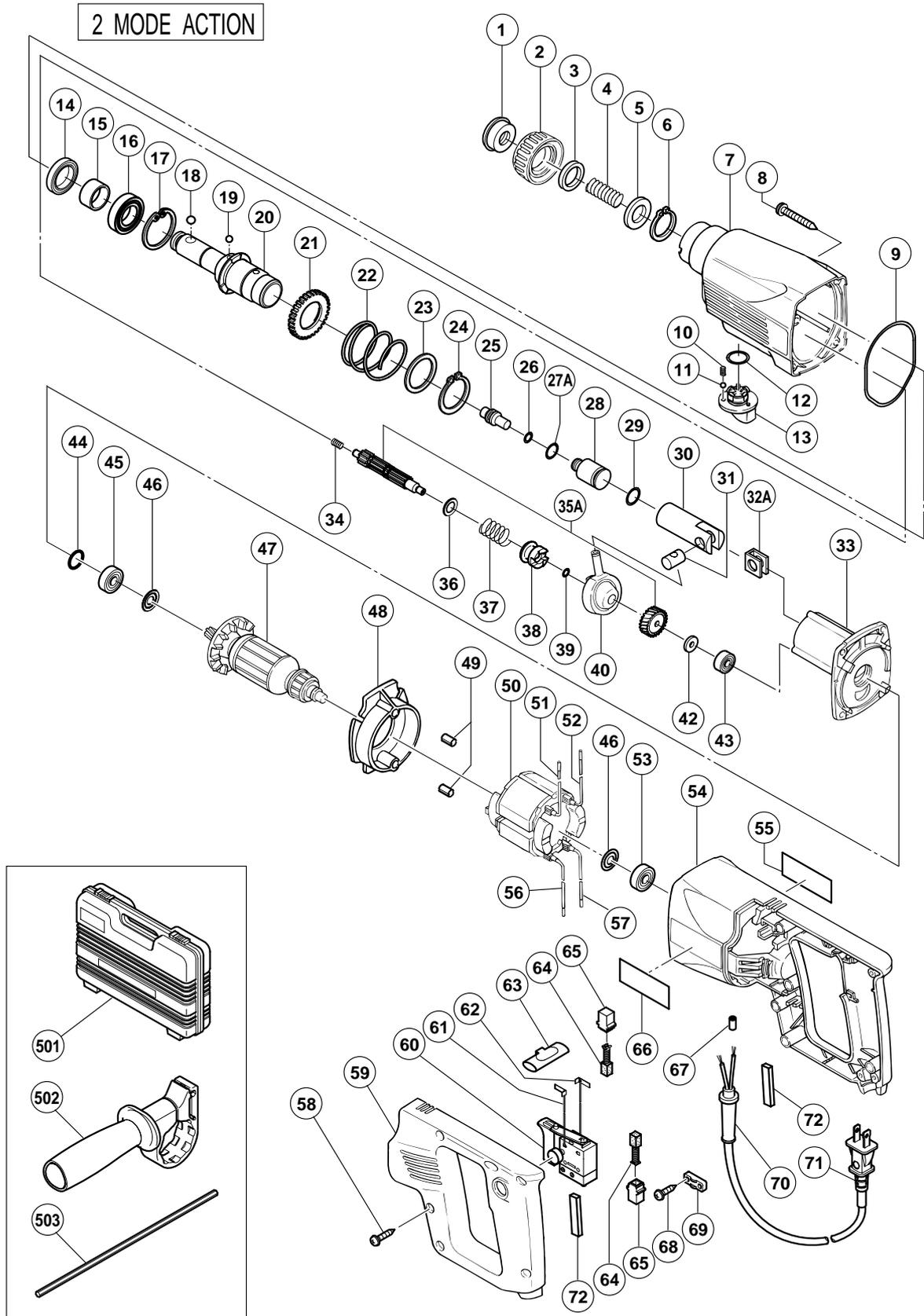
MODEL	Variable		10	20	30	40	50	60 min.
	Fixed	Work Flow						
DH 24PE [3-mode action]		General Assembly	Speed Control Switch Handle Cover Cord Cord Armor			Housing Stator		
			Armature Ass'y Inner Cover O-ring (P-22) Ball Bearing (608DD) Washer (A) Ball Bearing (608VV)					
			Change Lever O-ring (S-18)	Front Cap Grip Oil Seal	Cylinder Steel Ball x 4 Second Gear Spring (A) Washer (A) Second Hammer O-ring (B) O-ring (I.D. 10.5)	Gear Cover Ball Bearing (6904CM)		
			Striker O-ring (A) Piston Piston Pin Washer (C)	Gear.Shaft Set Pinion Sleeve Second Pinion Clutch Spring Clutch O-ring (S-8) Reciprocating Bearing Ball Bearing (626VV)				

ELECTRIC TOOL PARTS LIST

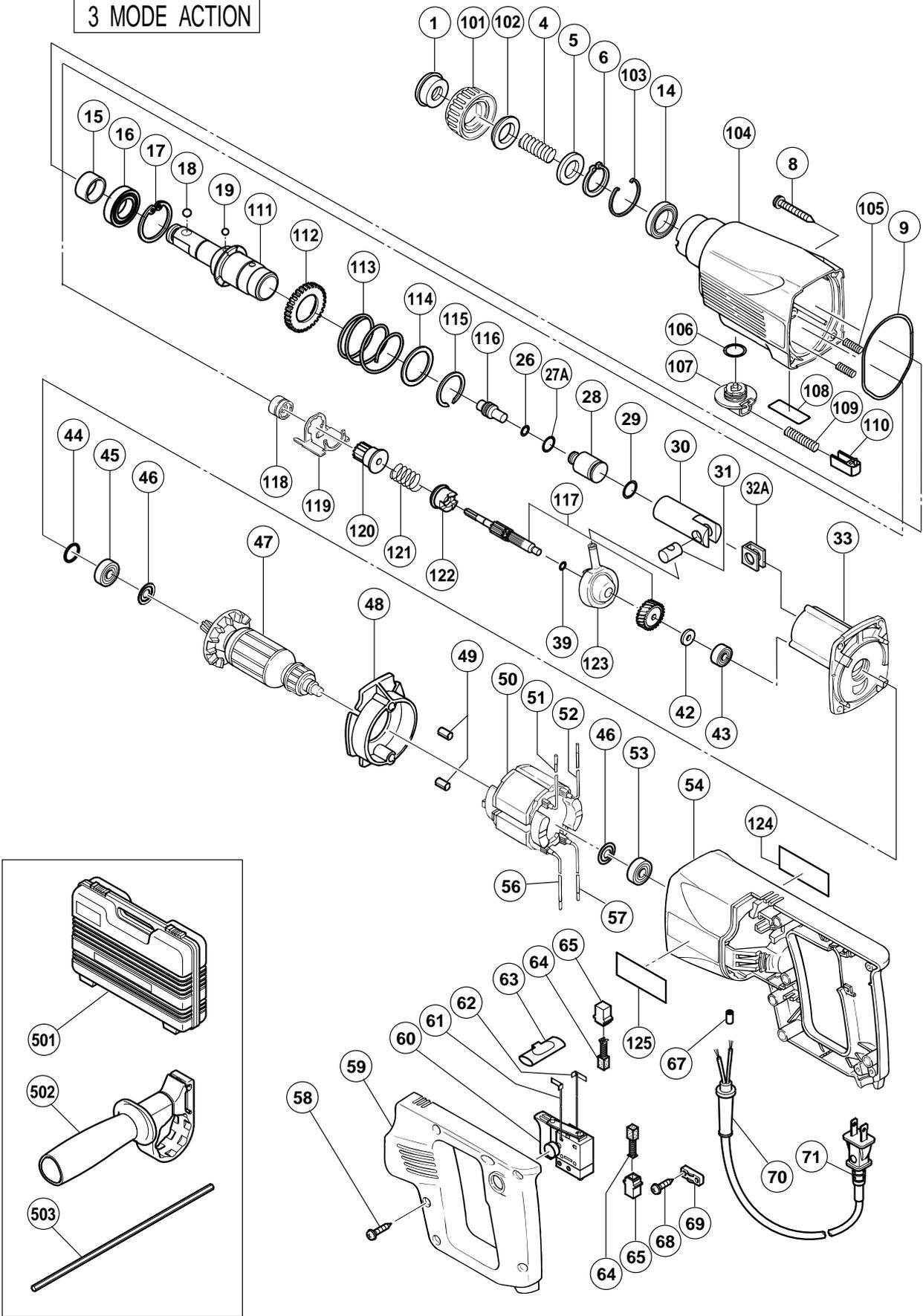
■ HAMMER DRILL Model DH 24PE

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(E2)



3 MODE ACTION



PARTS

DH 24PE

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
1	306-345	FRONT CAP	1	
*	2	306-992	GRIP	1 FOR 2 MODE ACTION
*	3	306-343	BALL HOLDER	1 FOR 2 MODE ACTION
	4	306-342	HOLDER SPRING	
	5	984-118	WASHER (B)	
	6	939-547	RETAINING RING FOR D20 SHAFT (10 PCS.)	
*	7	314-876	GEAR COVER	1 FOR 2 MODE ACTION
	8	301-654	TAPPING SCREW (W/FLANGE) D5X35	
	9	314-881	O-RING	
*	10	981-328	SPRING (H)	1 FOR 2 MODE ACTION
*	11	959-155	STEEL BALL D3.97 (10 PCS.)	1 FOR 2 MODE ACTION
*	12	314-878	O-RING	1 FOR 2 MODE ACTION
*	13	314-877	CHANGE LEVER	1 FOR 2 MODE ACTION
	14	307-688	OIL SEAL	
	15	307-690	SLEEVE	
	16	690-4CM	BALL BEARING 6904CM	
	17	986-147	RETAINING RING FOR D37 HOLE	
	18	959-156	STEEL BALL D7.0 (10 PCS.)	
	19	959-154	STEEL BALL D5.556 (10 PCS.)	
*	20	314-882	CYLINDER	1 FOR 2 MODE ACTION
*	21	301-677	SECOND GEAR	1 FOR 2 MODE ACTION
*	22	301-678	SPRING (A)	1 FOR 2 MODE ACTION
*	23	301-679	WASHER (A)	1 FOR 2 MODE ACTION
*	24	948-310	RETAINING RING FOR D30 SHAFT	1 FOR 2 MODE ACTION
*	25	301-671	SECOND HAMMER	1 FOR 2 MODE ACTION
	26	301-672	O-RING (B)	
	27A	301-680	O-RING (I.D. 10.5)	
	28	315-148	STRIKER	
	29	301-670	O-RING (A)	
	30	301-668	PISTON	
	31	301-666	PISTON PIN	
	32A	303-977	WASHER (C)	
	33	314-880	INNER COVER	
*	34	301-664	SPRING (B)	1 FOR 2 MODE ACTION
*	35A	315-161	GEAR.SHAFT SET	1 FOR 2 MODE ACTION
*	36	301-659	WASHER (B)	1 FOR 2 MODE ACTION
*	37	301-660	CLUTCH SPRING	1 FOR 2 MODE ACTION
*	38	301-661	CLUTCH	1 FOR 2 MODE ACTION
	39	992-912	O-RING (S-8)	
*	40	306-990	RECIPROCATING BEARING	1 FOR 2 MODE ACTION
	42	301-663	SPACER	
	43	626-VVM	BALL BEARING 626VVC2PS2L	
	44	876-796	O-RING (P-22)	
	45	608-DDM	BALL BEARING 608DDC2PS2L	
	46	982-631	WASHER (A)	
	47	360-446U	ARMATURE ASS'Y 110V-115V	1 INCLUD. 45, 46, 53
	48	314-879	FAN GUIDE ASS'Y	1 INCLUD. 49
	49	994-343	RUBBER BUSHING	
	50	340-398C	STATOR 110V-115V	
	51	314-902	INTERNAL WIRE (A)	
	52	314-900	INTERNAL WIRE (A)	

PARTS

DH 24PE

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
53	608-VVM	BALL BEARING 608VVC2PS2L	1	
54	314-897	HOUSING	1	
* 55		NAME PLATE	1	FOR 2 MODE ACTION
56	314-899	INTERNAL WIRE (A)	1	
57	314-901	INTERNAL WIRE (A)	1	
58	301-653	TAPPING SCREW (W/FLANGE) D4X20 (BLACK)	5	
59	314-898	HANDLE COVER	1	
60	314-894	SPEED CONTROL SWITCH (2P)	1	
61	314-895	INTERNAL WIRE (B)	1	
62	314-896	INTERNAL WIRE (B)	1	
63	313-163	PUSHING BUTTON	1	
* 64	999-041	CARBON BRUSH (1 PAIR)	1	
* 64	999-072	CARBON BRUSH (AUTO STOP TYPE) (1 PAIR)	1	
65	955-203	BRUSH HOLDER	2	
* 66		HITACHI LABEL	1	FOR 2 MODE ACTION
67	981-373	TUBE (D)	2	
68	984-750	TAPPING SCREW (W/FLANGE) D4X16	2	
69	937-631	CORD CLIP	1	
* 70	938-051	CORD ARMOR D10.1	1	
* 70	953-327	CORD ARMOR D8.8	1	
* 71	500-214Z	CORD	1	(CORD ARMOR D10.1) FOR TPE
* 71	500-249Z	CORD	1	(CORD ARMOR D8.8)
* 72	315-147	DUST PACKING	2	(TILL 7. 1998) FOR 2 MODE ACTION
* 101	317-229	GRIP	1	FOR 3 MODE ACTION
* 102	317-230	BALL HOLDER	1	FOR 3 MODE ACTION
* 103	317-236	RETAINING RING	1	FOR 3 MODE ACTION
* 104	317-221	GEAR COVER	1	FOR 3 MODE ACTION
* 105	317-238	SPRING (B)	2	FOR 3 MODE ACTION
* 106	878-885	O-RING (S-18)	1	FOR 3 MODE ACTION
* 107	317-222	CHANGE LEVER	1	FOR 3 MODE ACTION
* 108		THREE MODE LABEL	1	FOR 3 MODE ACTION
* 109	317-223	PUSHING SPRING	1	FOR 3 MODE ACTION
* 110	319-321	PUSHING BUTTON	1	FOR 3 MODE ACTION
* 111	317-231	CYLINDER	1	FOR 3 MODE ACTION
* 112	317-232	SECOND GEAR	1	FOR 3 MODE ACTION
* 113	317-233	SPRING (A)	1	FOR 3 MODE ACTION
* 114	317-234	WASHER (A)	1	FOR 3 MODE ACTION
* 115	317-235	RETAINING RING D30	1	FOR 3 MODE ACTION
* 116	317-384	SECOND HAMMER	1	FOR 3 MODE ACTION
* 117	317-226	GEAR.SHAFT SET	1	FOR 3 MODE ACTION
* 118	317-240	PINION SLEEVE	1	FOR 3 MODE ACTION
* 119	318-522	LOCK PLATE	1	FOR 3 MODE ACTION
* 120	317-239	SECOND PINION	1	FOR 3 MODE ACTION
* 121	321-688	CLUTCH SPRING	1	FOR 3 MODE ACTION
* 122	317-228	CLUTCH	1	FOR 3 MODE ACTION
* 123	317-225	RECIPROCATING BEARING	1	FOR 3 MODE ACTION
* 124		NAME PLATE	1	FOR 3 MODE ACTION
* 125		HITACHI LABEL	1	FOR 3 MODE ACTION

