

# Hitachi Power Tools

TECHNICAL DATA AND SERVICE MANUAL

LIST No. F407  
Jun. 2009

## PRODUCT NAME

# Hitachi Rotary Hammer

Model **DH 22PH**

## MARKETING OBJECTIVE

The new Model DH 22PH is a 3-mode type of rotary hammer.

This model features "hammering only" mode designed for chipping and groove digging, in addition to "rotation + hammering" mode and "rotation only" mode. The Model DH 22PH is equipped with a variable lock mechanism available in "hammering only" mode. The variable lock mechanism enables the tip angle of a cold chisel or other tool to be selected from among 36 levels.

The main features of the Model DH 22PH are as follows:

- (1) Although the Model DH 22PH is a 3-mode type rotary hammer, it is more compact and lightweight than the 2-mode type competitors in the same class (318 mm in overall length and 2.1 kg in weight).
- (2) The internal pressure adjustment mechanism prevents grease from leaking.

## APPLICATIONS

### (1) Rotation and hammering function

- Drilling anchor holes
- Drilling holes into 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) Hammering only function

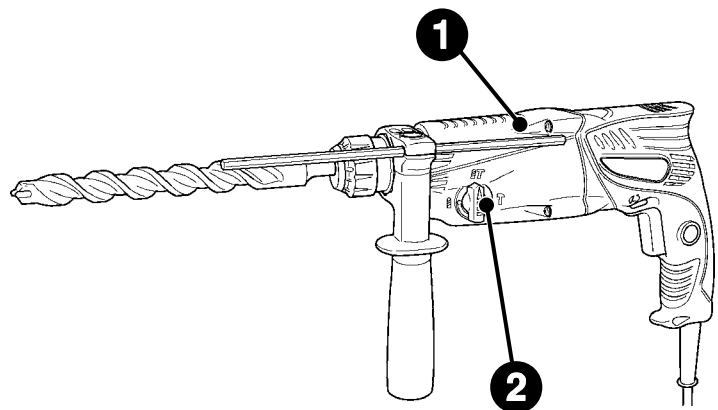
- Light-duty chiseling of concrete
- Groove digging and edging

## SELLING POINTS

### [ NEW FEATURES ]

- 1** Most compact and lightweight in its class
- 2** Hitachi's own internal pressure adjustment mechanism

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT.



**HITACHI**

**Hitachi Koki Co., Ltd.**  
International Sales Division

**D**

**REMARK:**

For more information about HANDLING INSTRUCTIONS, visit our website at:

<a href="http://www.hitachi-koki.com/manual_view_export/">http://www.hitachi-koki.com/manual_view_export/</a>
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Throughout this TECHNICAL DATA AND SERVICE MANUAL, a symbol(s) is(are) used in the place of company name(s) and model name(s) of our competitor(s). The symbol(s) utilized here is(are) as follows:

Symbols utilized	Competitors	
	Company name	Model name
B	BOSCH	GBH2-23RE
C	MAKITA	HR2230

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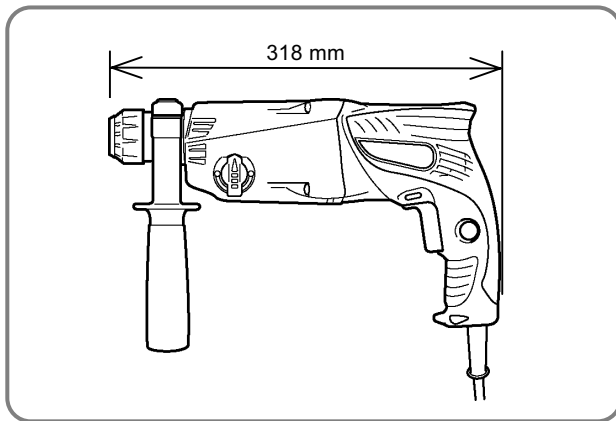
## SELLING POINTS

### 1 Most compact and lightweight in its class\*

\* Based on our own research

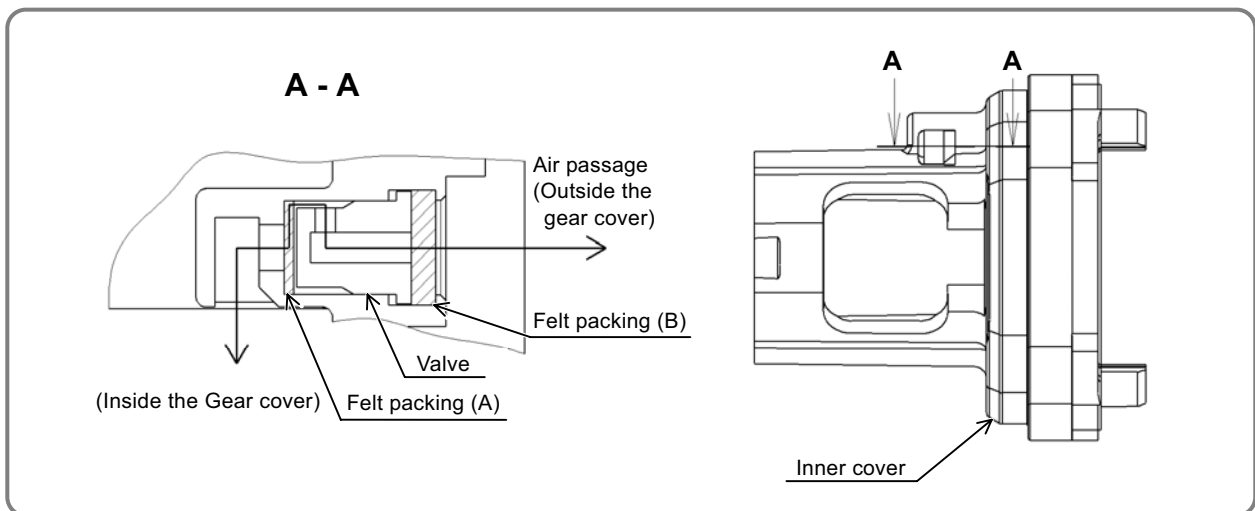
Although the Model DH 22PH is a 3-mode type rotary hammer, it is more compact and lightweight than the 2-mode type competitors in the same class.

Maker Model	HITACHI DH 22PH	B	C
Overall length	318 mm	342 mm	357 mm
Weight	2.1 kg	2.3 kg	2.5 kg



### 2 Hitachi's own internal pressure adjustment mechanism

An air passage is provided as shown below to let out air inside the gear cover and let outside air in the gear cover. This passage is sandwiched between felt packings to allow only air to pass. As a result, fluctuations in internal pressure are minimized for stable hammering operation and preventing grease leakage.



# SPECIFICATIONS

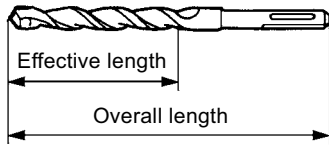
## 1. Specifications

Model		DH 22PH
Capacity: Concrete	mm	22
	Inch	7/8
Capacity: Steel/Wood	mm	13/24
	Inch	1/2" /1"
Input power	W	620
Impact energy	J	1.7
No-load rpm (Forward)	min <sup>-1</sup>	0 to 1,400
No-load rpm (Reverse)	min <sup>-1</sup>	0 to 910
Full-Load bpm	min <sup>-1</sup>	0 to 5,600
Mode	–	3
Variable speed	–	YES
Reverse switch type	–	Push button
Soft grip	Handle	No
	Gear cover	No
Overall length	mm	318
	Inch	12 to 1/2"
No load vibration level (Tri-axial, measured)	m/s <sup>2</sup>	12.1
Full load vibration level (Tri-axial, measured)	m/s <sup>2</sup>	13.2
No load noise level (measured)	dB	95.2
Full load noise level (measured)	dB	89.4
Weight	kg	2.1
	lbs	4.6

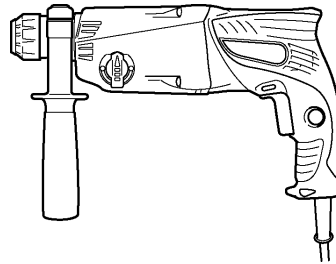
## 2. Optional Accessories

### (1) Drilling anchor holes (rotation and hammering)

Drill bit (SDS-plus shank)

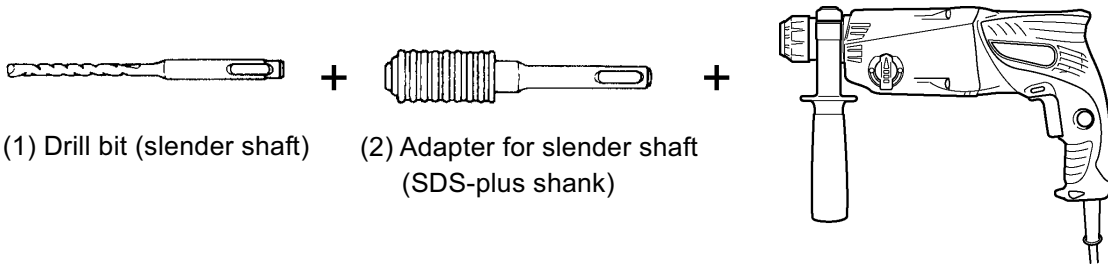


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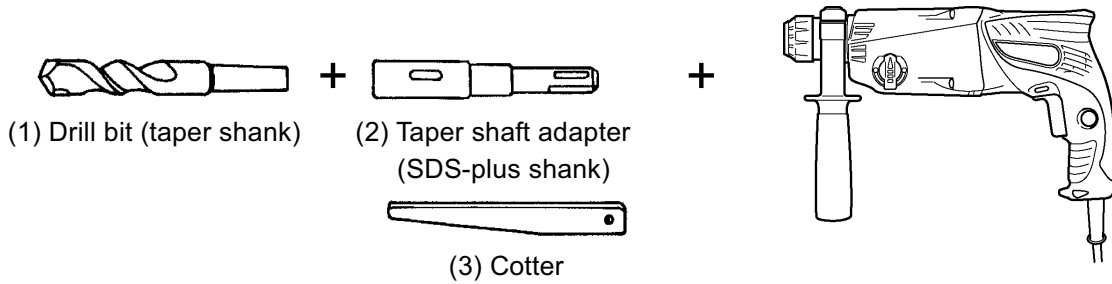
Outer dia. (mm)	Overall length (mm)	Effective length (mm)	Code No.	Outer dia. (mm)	Overall length (mm)	Effective length (mm)	Code No.		
4.0	110	50	303571	12.5	166	100	303592		
4.3			303572	12.5	260	200	303607		
4.5			303573	12.7	166	100	303593		
4.8			303574	12.7	260	200	303608		
5.0			303575	13.0	166	100	303594		
5.0	303578	14.0	303595						
5.5	110	50	303576	14.3	260	200	303596		
6.0			303577	14.3			303609		
6.0	160	100	303579	14.5	166	100	303597		
6.4			303580	14.5	260	200	303610		
6.5			166	100	303581	15.0	100	303598	
7.0					303582	16.0		303599	
7.5			166	100	303583	16.0	260	200	303611
8.0					303584	16.5	166	100	303600
8.5			303585	17.0	303601				
9.0			303586	17.0	260	200	308485		
9.5			303587	17.5	166	100	303602		
10.0			303588	17.5	260	200	303612		
10.0	260	200	303604	18.0	166	100	303603		
10.5	160	100	303589	19.0	260	200	303613		
10.5	260	200	303605	20.0	250	200	303614		
11.0	160	100	303590	22.0			303615		
12.0	166	100	303591						
12.0	260	200	303606						

Slender bit and adapter for slender shaft (SDS-plus shank)



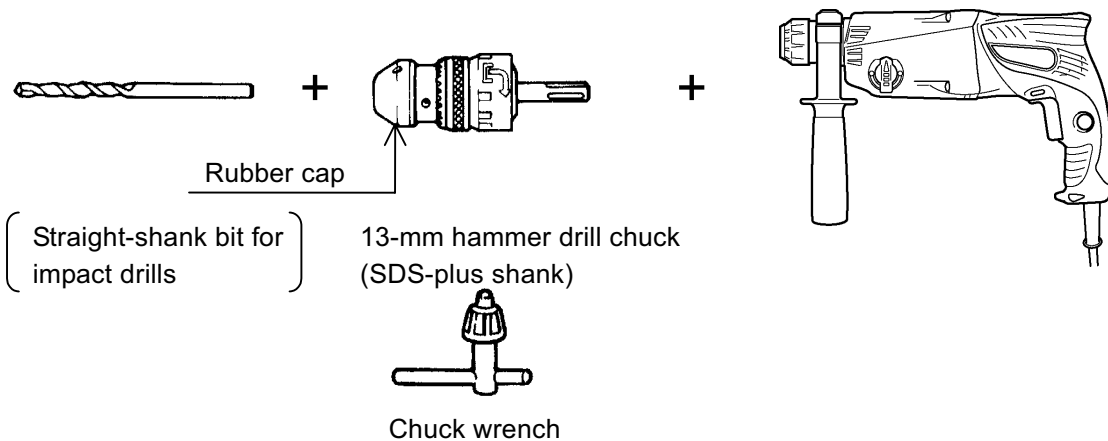
(1) Drill bit (slender shaft)				(2) Adapter for slender shaft
Outer dia. (mm)	Overall length (mm)	Effective length (mm)	Code No.	Code No.
3.4	90	45	306369	306370
3.5			306368	

Drill bit (taper shank)



(1) Drill bit (taper shank)		(2) Taper shank adapter		(3) Cotter
Outer dia. (mm)	Code No.	Type	Code No.	Code No.
11	944460	Morse taper No. 1	303617	944477
12.3	944461			
12.7	993038			
14.3	944462			
14.5	944500			
17.5	944463			

13-mm hammer drill chuck



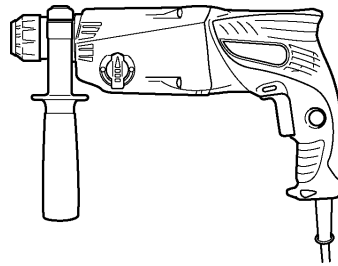
Part name	Code No.
13-mm hammer drill chuck (including chuck wrench and rubber cap)	303332
Chuck wrench	303334
Rubber cap	303335

**(2) Anchor setting (hammering only)**

Anchor setting bar

Anchor setting adapter  
(SDS-plus shank)

+



Part name	Overall length (mm)	Code No.	Part name	Overall length (mm)	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		

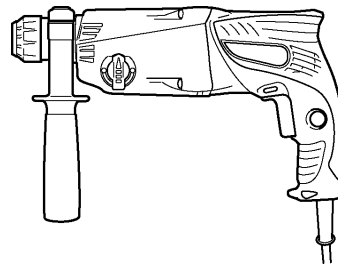
**(3) Bolt placing operations with chemical anchor (rotation + hammering)**



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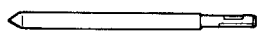
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(Standard sockets available on the market) 12.7-mm (1/2") Chemical anchor adapter (SDS-plus shank)  
19-mm (3/4") Chemical anchor adapter (SDS-plus shank)

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

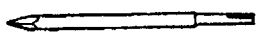
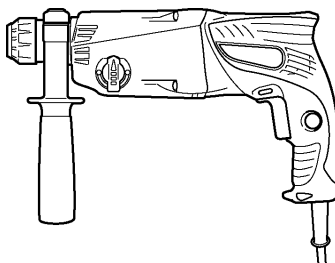
**(4) Crushing operation (hammering only)**



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

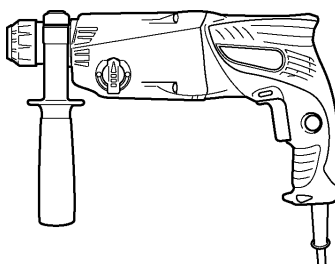
Code No. 303046



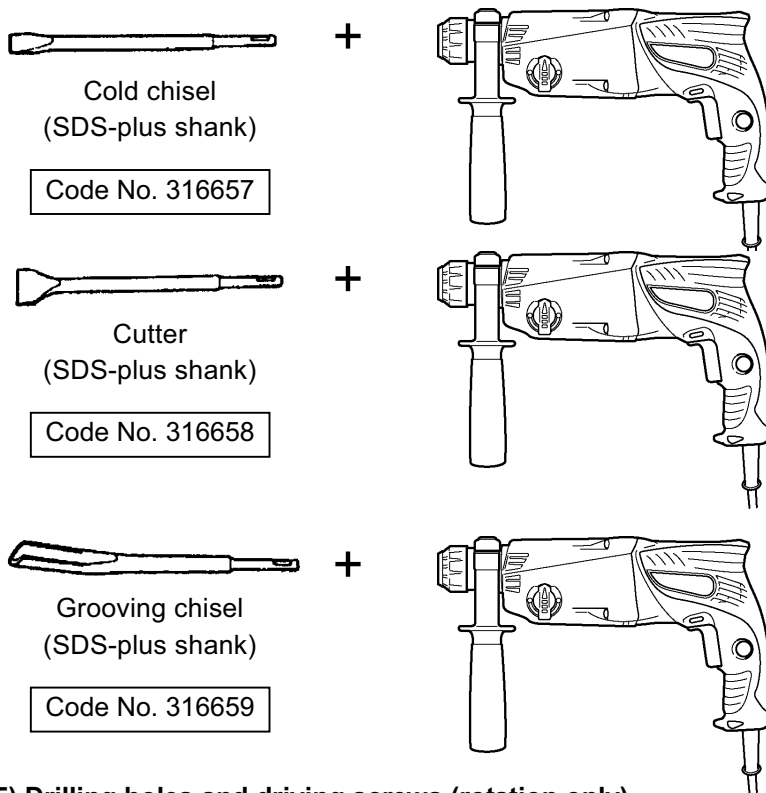
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Square bull point  
(SDS-plus shank)

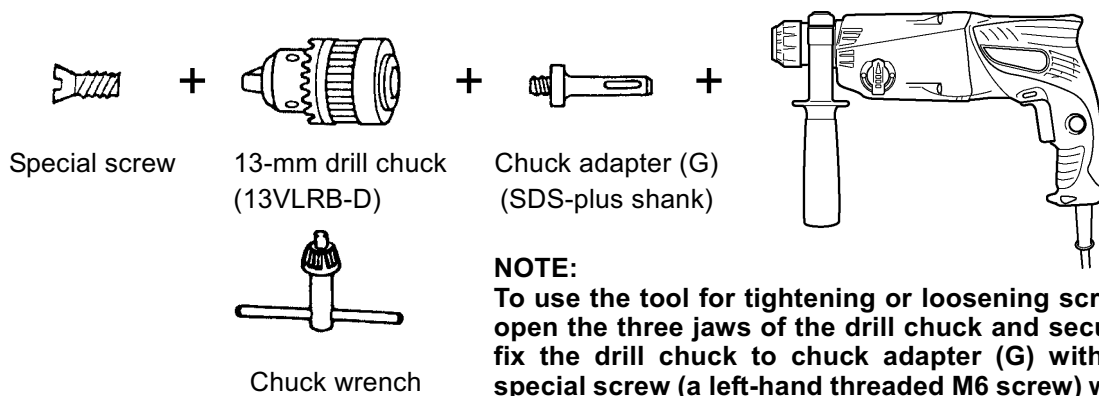
Code No. 316656







**(5) Drilling holes and driving screws (rotation only)**

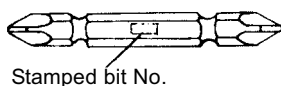


**NOTE:**  
To use the tool for tightening or loosening screws, open the three jaws of the drill chuck and securely fix the drill chuck to chuck adapter (G) with the special screw (a left-hand threaded M6 screw) when mounting the drill chuck onto chuck adapter (G).

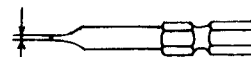
Part name	Code No.
Chuck adapter (G)	303623
13-mm drill chuck (with chuck wrench)	321814
Special screw (M6 left-hand threaded)	981122

(1) Cross-recessed head (Phillips) bit  
[Overall length: 65 mm]  
(For use with cross-recessed head (Phillips) screw))

(2) Slotted-head (minus) bit  
[Overall length: 70 mm]  
(For use with slotted-head (minus) screw))



Stamped bit No.



Tip thickness

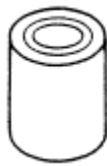
Bit No.	Code No.	Applicable screw dia. (mm)
No. 2	983006	3 to 5
No. 3	983011	6 to 8 *

Bit tip thickness	Code No.	Applicable screw dia. (mm)
0.8	955659	4
1	955674	5 to 6

\* Temporary tightening

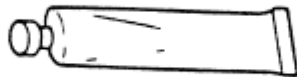
**(6) Grease for hammer and hammer drill**

- Containing 500 g



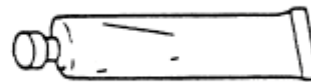
Code No. 980927

- Containing 30 g



Code No. 981840

- Containing 70 g



Code No. 308471

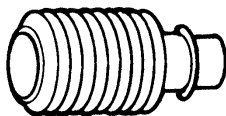
**(7) Dust cup and dust collector (B)**

- Dust cup



Code No. 971787

- Dust collector (B)



Code No. 306885

## COMPARISON WITH SIMILAR PRODUCTS

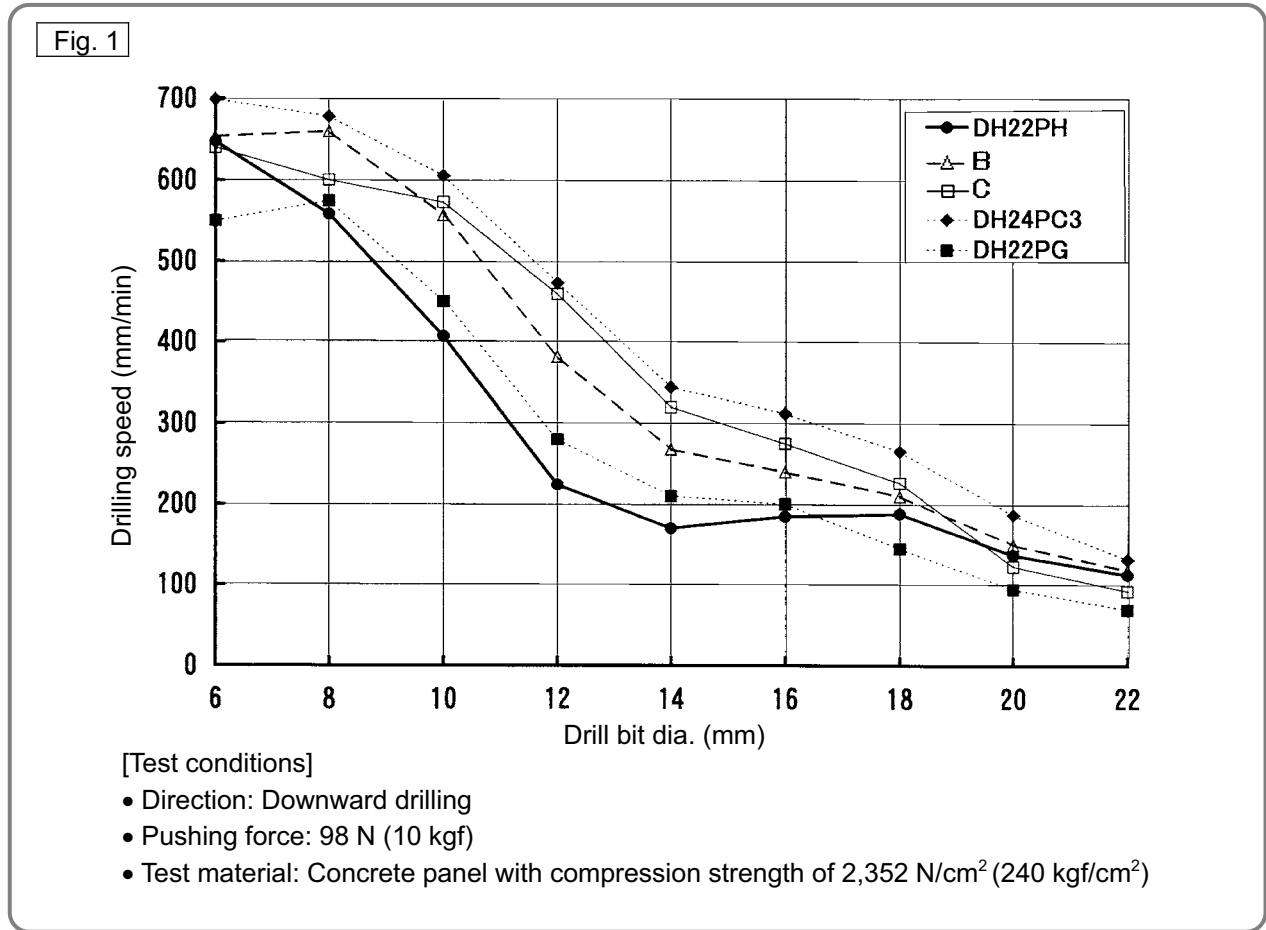
### 1. Comparison of Specifications

(Superior specifications: )

Maker		HITACHI	B	C
Model name		DH 22PH		
Capacity: Concrete	mm	22	23	22
	Inch	7/8"	29/32"	7/8"
Capacity: Steel/Wood	mm	13/24	13/30	13/32
	Inch	1/2"/1"	1/2"/1 to 3/16"	1/2"/1 to 1/4"
Input power	W	620	650	710
Impact energy	J	1.7	2.5	2.3
No-load rpm (Forward)	min <sup>-1</sup>	0 to 1,400	0 to 1,000	0 to 1,050
	min <sup>-1</sup>	0 to 910	0 to 1,000	0 to 1,050
Full-load bpm	min <sup>-1</sup>	0 to 5,600	0 to 4,400	0 to 4,050
Mode	–	3	2	2
Variable speed	–	Yes	Yes	Yes
Reverse switch type	–	Push button	CB holder	CB holder
Soft grip	Handle	No	Yes	Yes
	Gear cover	No	No	Yes
Overall length	mm	318	342	357
	Inch	12 to 1/2"	13 to 7/16"	14 to 1/16"
No-load vibration level (Tri-axial, measured)	m/s <sup>2</sup>	12.1	12.4	8.7
Full-I load vibration level (Tri-axial, measured)	m/s <sup>2</sup>	13.2	16.8	16.2
No-I load noise level (measured)	dB	95.2	91.3	87.7
Full-I Load noise level (measured)	dB	89.4	87.1	85.0
Weight	kg	2.1	2.3	2.5
	lbs	4.6	5.1	5.5
Internal pressure adjustment mechanism	–	Yes	Yes	Yes

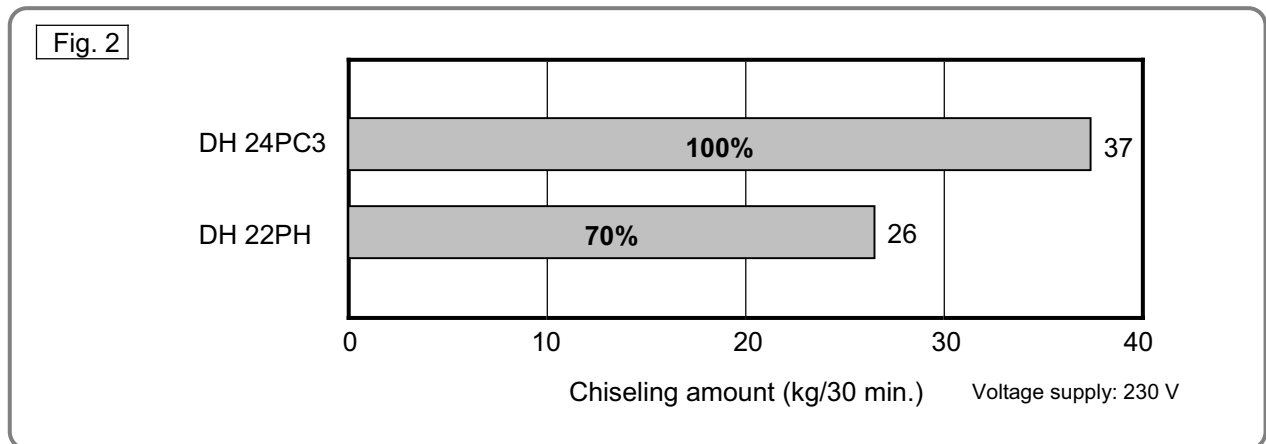
## 2. Comparison of Drilling Speed

Drilling speed varies considerably depending on the work conditions. Use the factory test results shown in Fig. 1 for comparison purposes only.



## 3. Comparison of Chiseling Performance

Chiseling performance varies considerably depending on the work conditions. Use the factory test results shown in Fig. 2 for comparison purposes only.



# PRECAUTIONS ON SALES PROMOTION

## 1. Safety Instructions

In the interest of promoting the safest and most efficient use of the Model DH 22PH Rotary Hammer by all of our customers, it is very important when conducting a sale that the salesperson carefully ensure that the buyer seriously recognizes the importance of the Handling Instructions, and fully understands the precautions listed on the Caution Plate and Nameplate attached to each tool.


### A. Handling Instructions

Although every effort is made in each step of design, manufacture, and inspection to provide protection against safety hazards, the dangers inherent in using any electric tool cannot be completely eliminated. Accordingly, the Handling Instructions list general precautions and suggestions on the use of electric power tools, and specific precautions and suggestions on the use of the Rotary Hammer to enhance the safe, efficient use of the tool by the customer. Salespersons must be thoroughly familiar with the contents of the Handling Instructions in order to offer appropriate guidance to customers during sales promotion activities.

### B. Caution Plate

Each Model DH 22PH unit is provided with a Caution Plate (shown below) that lists basic safety precautions on its use. Carefully ensure that customers fully understand and follow these precautions before using the tool.

[For the USA and Canada]

**-WARNING-** ● To reduce the risk of injury, user must read and understand instruction manual.  M:  
**AVERTISSEMENT** ● Afin de réduire le risque de blessures, l'utilisateur doit lire et bien comprendre le mode d'emploi.

[For China]

**注意：使用前请仔细阅读使用说明书**

[For Mexico]

**ADVERTENCIA**  
● Lea las instrucciones de manejo antes de usar.

[For Taiwan]

**注意**  
● 使用前請詳讀使用說明書

# REFERENCE MATERIALS

## 1. Lubrication

Replenish the grease lubricant when disassembling the tool or in case grease leaks due to a defective seal. Grease must be changed once a year to prolong tool service life. Special grease is used in the striking section. Should the striking section (inside the gear cover) be disassembled, completely remove the old grease from all parts and, at reassembly, replenish 30 g of new grease in the gear cover and 10 g in the groove of the inner cover. Be careful not to exceed the designated amount of grease. Excessive grease will reduce striking efficiency.

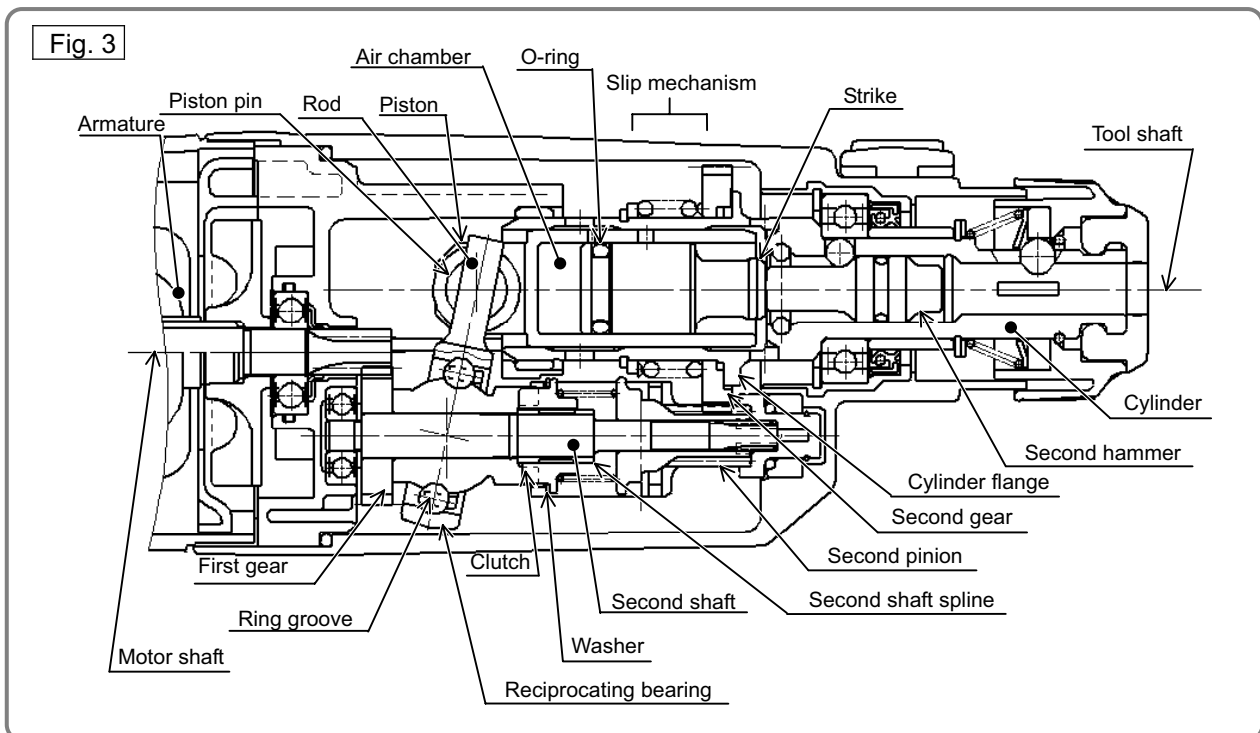
## 2. Tool Structure

### ○ Transmission of rotation

See Fig. 3. Armature rotation is transmitted to the second shaft via the first gear, causing the second shaft to rotate. The second pinion mounted on the second shaft engages with 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 both 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 a steel ball, and transmits rotation to the drill bit.

### ○ Piston reciprocating mechanism

The Model DH 22PH adopts a spiral drive system (i.e., mechanism using a reciprocating bearing), resulting in a more compact design with the armature shaft arranged in parallel with the tool shaft. Figure 3 shows the structure of the piston reciprocating mechanism.



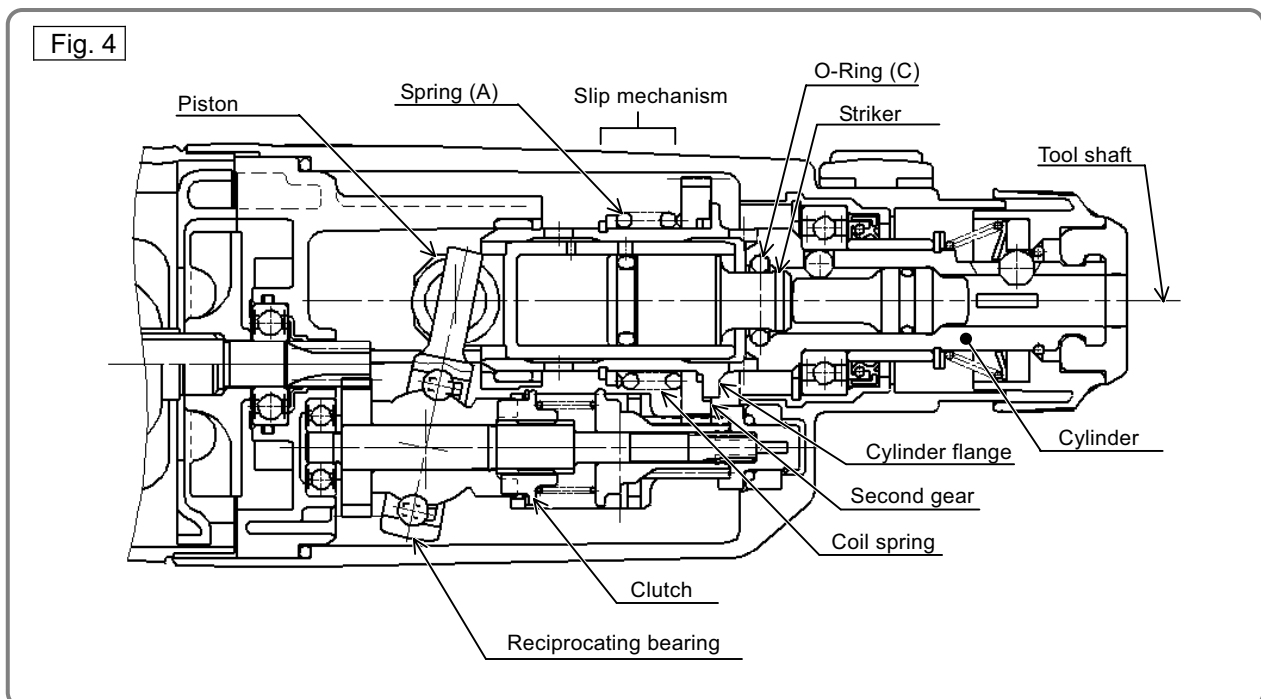
Armature rotation is transmitted to the second shaft via the first gear. Rotation of the second shaft is then transmitted through a spline on the second shaft to the clutch, which engages with a reciprocating bearing, causing the bearing to rotate. However, circular grooves on the inner race of the reciprocating bearing are positioned at an angle of inclination relative to the second shaft. The rotation of the inner race and shaft causes the angle of inclination to change regularly in the forward and backward directions with respect 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, causing the piston reciprocating motion.

### ○ Hammering function

The piston reciprocates within the cylinder to move the striker the same way as in conventional rotary hammers. As the piston reciprocates, changing air pressure inside the air chamber between the piston and striker causes the striker to move and repeatedly strike against the end of the second hammer. At the same time, changing air pressure within the air chamber that moves the striker also provides an "air cushion" to absorb the impact of hammering action. Since any air leaking from the air chamber weakens this air-cushioning effect and reduces the absorption of impact, the O-ring (mounted on the striker) is extremely important in serving as an air seal. Although a special rubber material is utilized in the O-ring construction to maximize effective O-ring service life, wear cannot be fully avoided. Accordingly, the O-ring should be replaced about once a year, depending on how often the tool is used.

### ○ Idle striking prevention mechanism

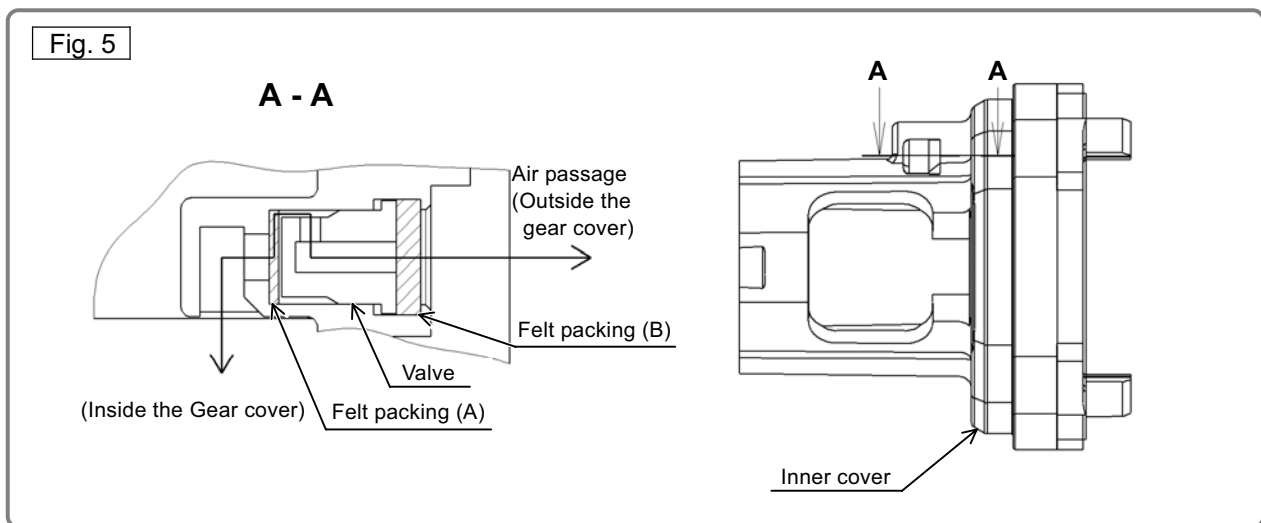
The idle hammering prevention mechanism in the Model DH 22PH differs from that of conventional rotary hammers. When the drill bit is lifted from the concrete surface after drilling, the second hammer moves to the position indicated by the continuous line in Fig. 4 and the protrusion at the tip of the striker is gripped by O-ring (C) mounted between the hammer holder and damper holder.



In this state, should the piston continue to move so that the inner cylinder wall blocks the small piston vent hole, air in the air chamber will pass through the large piston vent hole and be discharged through the air-escape slot and large cylinder vent hole provided on the inner cylinder wall. Accordingly, there is no change in air pressure within the air chamber, thereby preventing striker movement. The gripping force of O-ring (C) on the striker is so small compared to the conventional mouth system, that practically no pressing force at all is required to restart hammering operation.

### ○ Internal pressure adjustment mechanism

An air passage is provided as shown in Fig. 5 to let out air inside the gear cover and let outside air in the gear cover. This passage is sandwiched between felt packings to pass only air (pressure). As a result, fluctuations in internal pressure are minimized for stable hammering operation and preventing grease leakage.



### ○ Slip mechanism

The slip mechanism in the Model DH 22PH consists of a coil spring that applies a pre-set amount of pressure to ensure the interlocking of three claws provided on the flange of the cylinder (i.e., final rotating shaft) and the matching claws provided on the face of the second gear, which transmits rotation to the cylinder. The second gear is fitted to the cylinder with a certain amount of play. If excessively large torque is applied to the tool shaft (cylinder), the force of the torque will exceed the coil spring pressure and cause the claws on the second gear to disengage from and ride over the claws on the cylinder; therefore, the second gear remains idle and does not transmit rotation. Even if the drill bit comes into contact with a reinforcing bar within the concrete, causing sudden excessive torque, the slip mechanism functions to prevent damage to the gears and possible loss of tool control by the operator (slip torque setting applied to the tool shaft: 1.0 to 2.0 kgm).

### ○ Sealed and dust-proof construction

The gear cover is totally enclosed by oil seals, O-rings and other devices to prevent lubricating grease from leaking, and 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 that could cause improper drill bit fitting and/or other faulty operation of the chuck section. The speed control switch is also fully dust-proof to prevent dust and chips from entering the handle section and causing possible operational trouble or insulation breakdown.

### ○ Speed control

The Model DH 22PH is equipped with a variable speed control switch that lets you freely select the rotation speed and hammering force. When drilling into fragile materials, pull the switch trigger gently for low rotation speed (hammering force) to achieve optimum results. Note that the switch trigger can only be pulled halfway in reverse drilling, at a speed about half of that in forward drilling. In addition, the switch stopper cannot be used in reverse drilling.

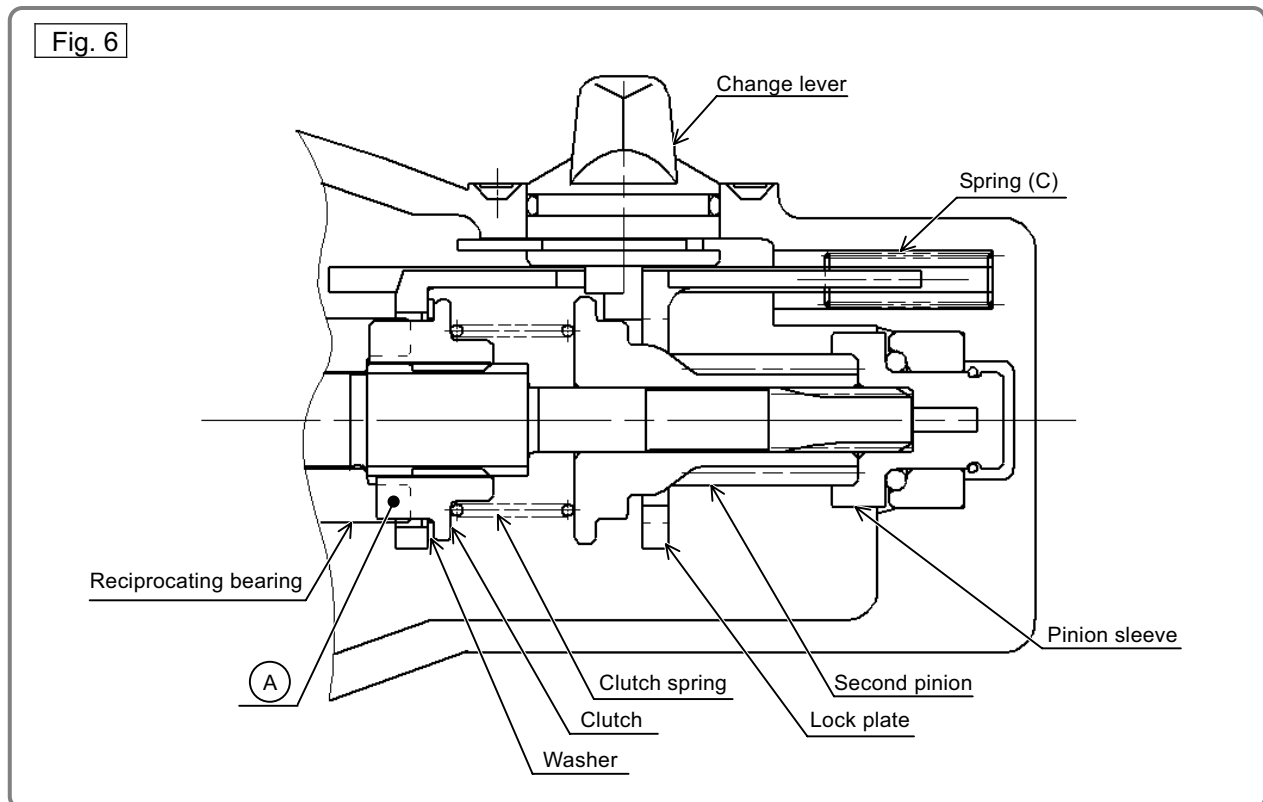


### 3. "3-Mode" Changeover Mechanism


The change lever of the Model DH 22PH permits quick and easy changeover among the "rotation and hammering," "rotation only" and "hammering only" functions. Each function mode is explained below. When operating the change lever, be sure to hold down the pushing button.

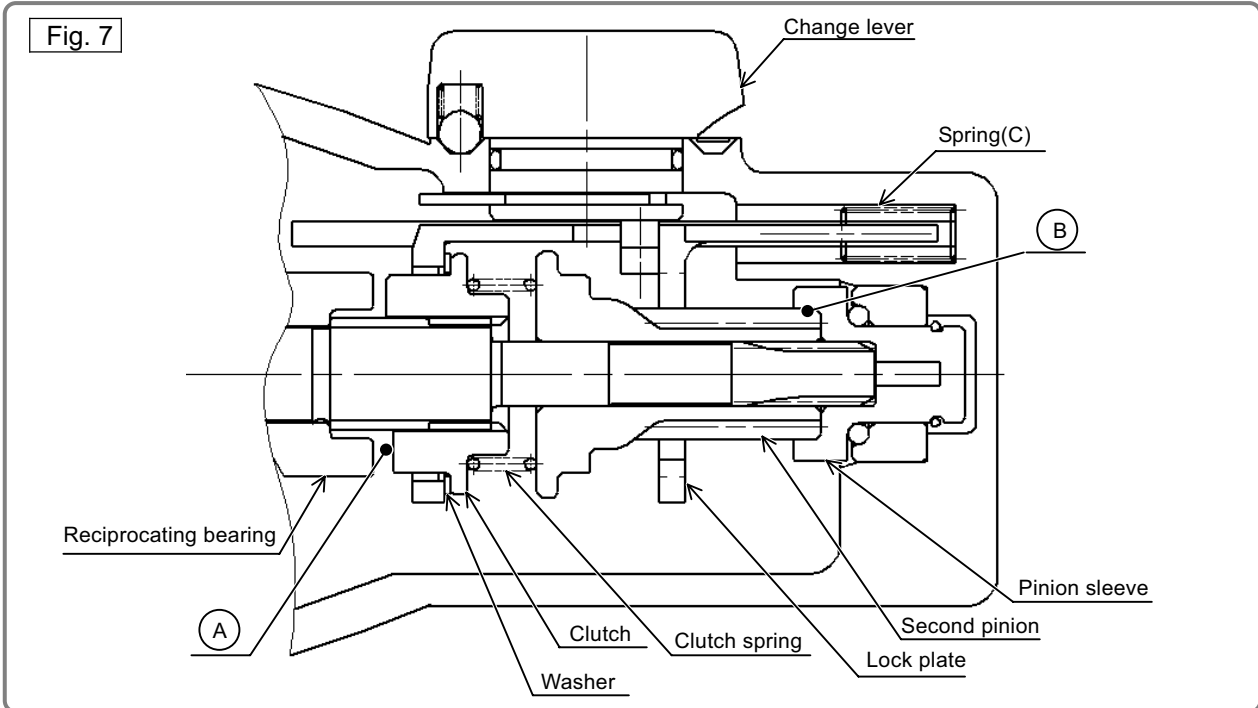
#### (1) Rotation and hammering (Fig. 6)

Set the change lever to "rotation and hammering" ( **IT** 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 (at A in the figure) to convert the rotation into reciprocating motion. The three claws on the tip of the second shaft are constantly engaged with the three matching claws of the pinion sleeve, and second shaft rotation is transmitted to the pinion sleeve. Then the claws on the large-dia. portion of the pinion sleeve engage with the second pinion (at B in Fig. 7) to transmit rotation to the second gear and the cylinder.




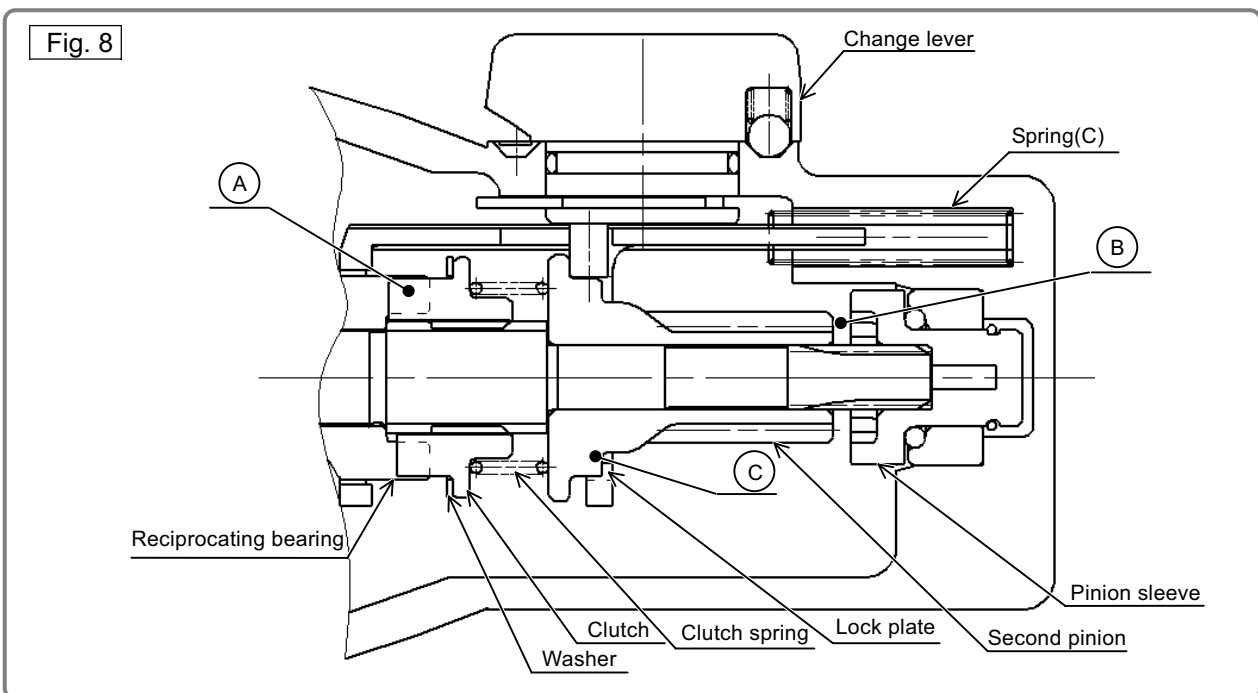
(2) Rotation only (Fig. 7)

Set the change lever to "rotation only" (  mark). The pin of the change lever moves the lock plate forward, and the clutch moves forward at the back end of the lock plate. Engagement is released between the clutch and claws of the reciprocating bearing (at A in the figure). As a result, no rotation is transmitted to the reciprocating bearing and hammering stops. Conversely, for the "rotation only" function, the pinion sleeve engages with the second pinion (at B in the figure) to transmit rotation to the pinion sleeve.



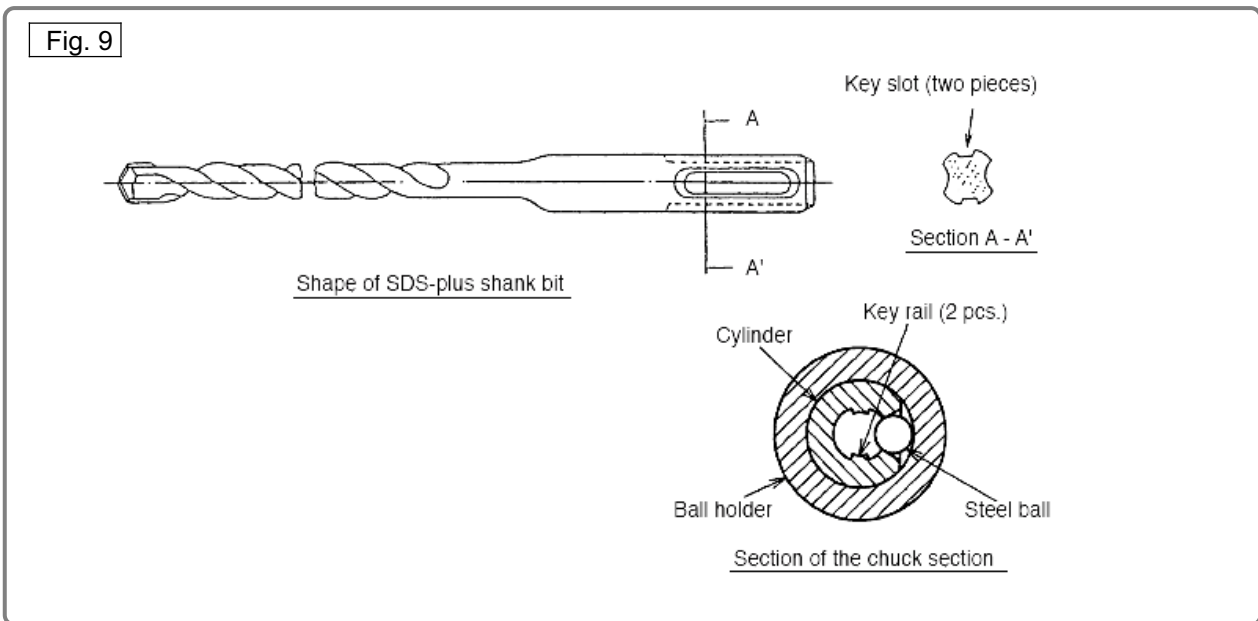
(3) Hammering only (Fig. 8)

Set the change lever to "hammering only" (  mark). The pin of the change lever moves the second pinion to the motor side. Engagement is released between the pinion sleeve and second pinion, so that no rotation is transmitted (at B in the figure). The lock plate is moved to the motor side by spring (B) and engages with the locking claw of the second pinion to lock cylinder rotation (at C in the figure). Conversely, for the "hammering only" function, the clutch engages with the reciprocating bearing (at A in the figure).

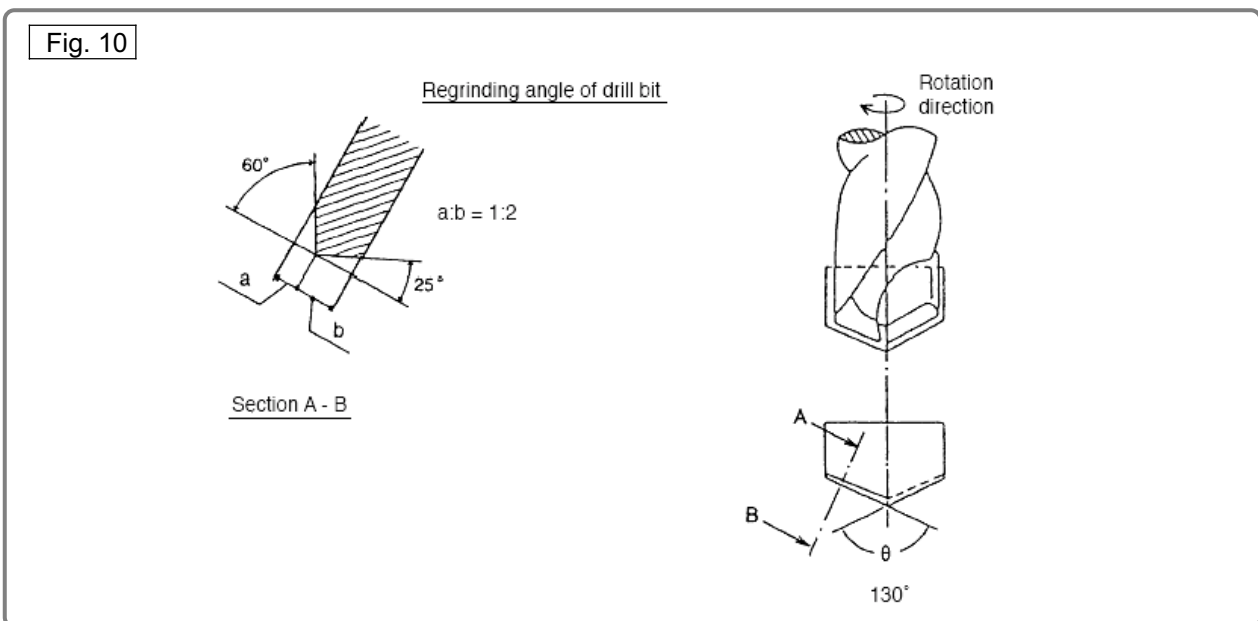


## 4. Drill Bits

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 falling out.



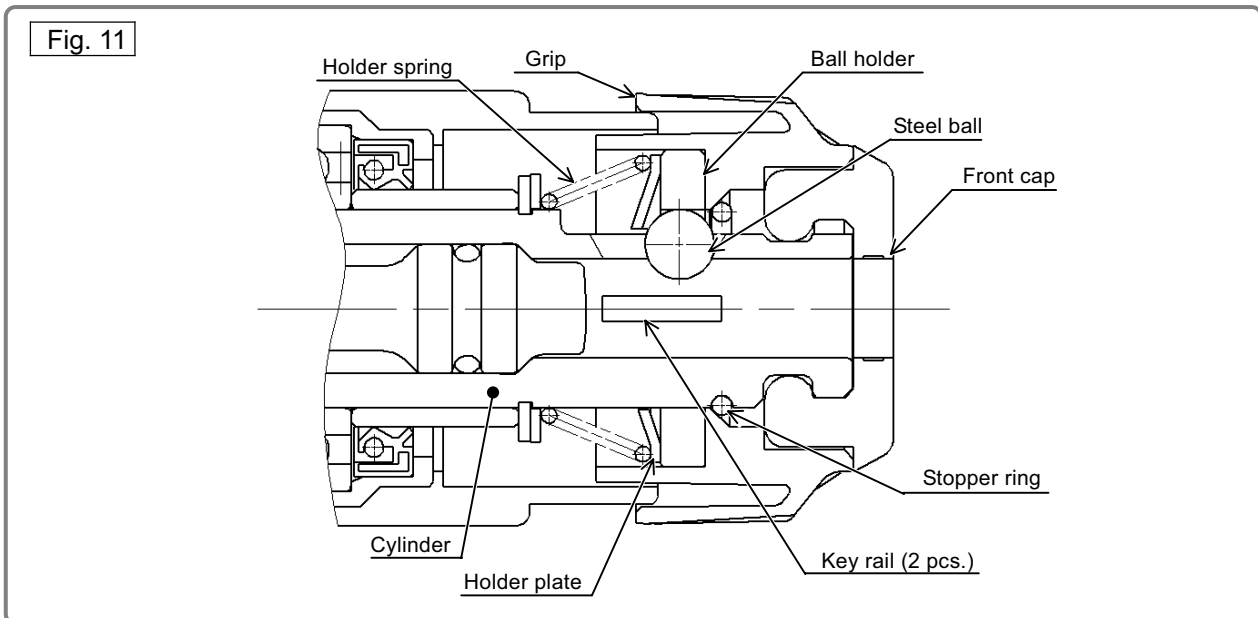
A drill bit with a diameter of 8 mm has a service life of about 300 holes when drilling holes into concrete to a depth of 30 mm. If reground before the end of its service life, the drill bit will continue to provide efficient drilling. Figure 10 shows the regrinding angle.



## 5. Tool Retainer Section

Fig. 11 shows the structure of the tool retainer.

The tip of the tool retainer is covered with a front cap (made of rubber) to prevent dust and chips from getting inside. The steel ball falls into the round groove of the bit to prevent the tool from coming off; the two key rails transmit the rotation torque. To mount the bit, push the bit in the tool retainer as far as it will go. Push lightly and turn the bit until it is caught. At this position, push the bit in as far as it will go (and note that mounting the bit requires no sliding of the grip). To remove the bit, fully slide the grip backward and remove the bit.

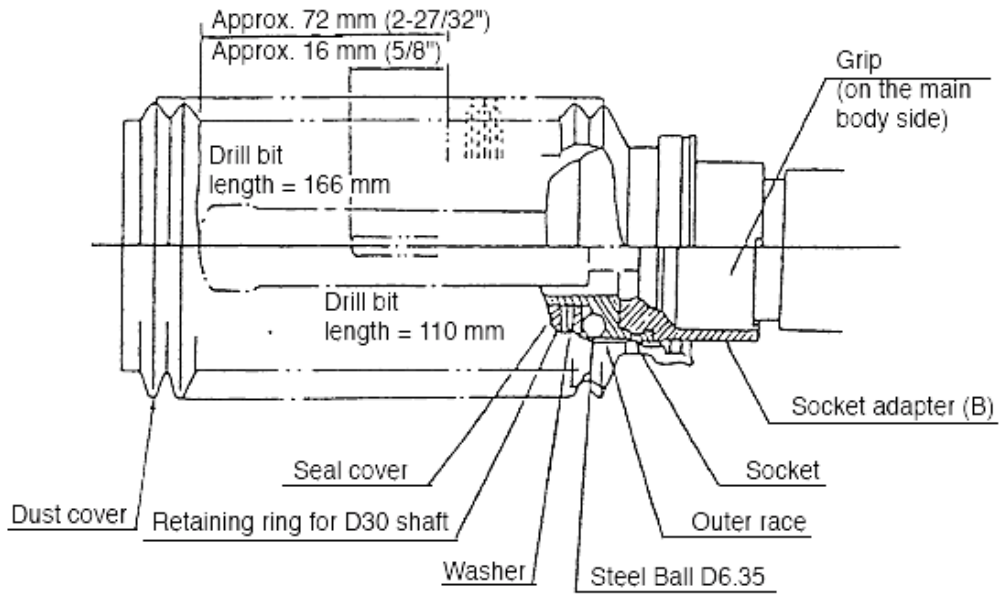


## 6. Dust Collector (B)

When drilling holes overhead, dust collector (B) (an optional accessory) can be mounted on the Model DH 22PH to prevent dust and chips from falling downward. Dust collector (B) is intended solely for use when drilling holes into concrete, and cannot be used for drilling holes into steel or wood. It is designed for use with drill bits with overall lengths of 166 mm, 160 mm and 110 mm, and cannot be used with longer bits. The use of a drill bit with an overall length of 166 mm with dust collector (B) permits drilling down to a depth of about 72 mm. When using dust collector (B), be sure to securely fasten it to the grip on the main body with socket adapter (B). Although socket adapter (B) rotates together with the tool shank, there is a steel ball between the outer race and socket that 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 with the dust cover not being held against a concrete surface, friction may disconnect dust collector (B) from the grip. Accordingly, instruct the customer to press dust collector (B) and the 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 be scattered after drilling operation, the customer should be advised to always wear protective glasses or goggles. When disassembling dust collector (B) 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



# REPAIR GUIDE

Be sure to disconnect the power cord plug from the wall outlet before conducting repair. Otherwise, the motor may suddenly run, posing a very dangerous situation.

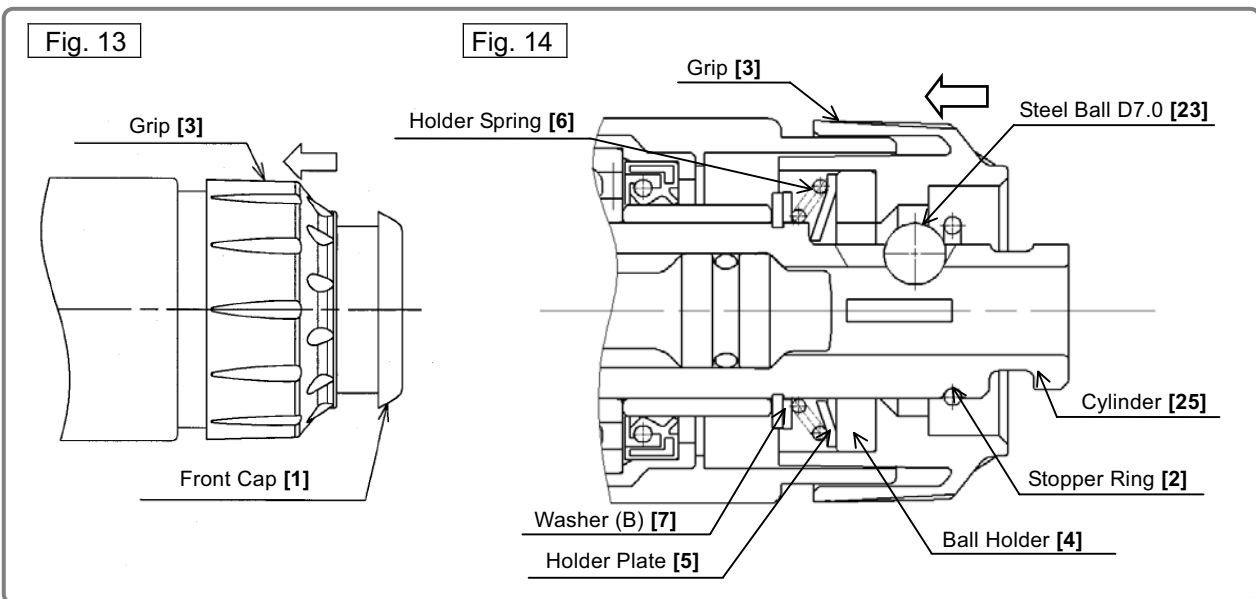
## 1. Precautions on Disassembly and Reassembly

The **[Bold]** numbers in the descriptions below correspond to item numbers in the Parts List and exploded view assembly diagram for the Model DH 22PH.

### Disassembly

#### 1. Disassembly of the tool retainer

While fully pulling the Grip [3] in the arrow direction, remove the Front Cap [1]. While pulling the Grip [3] in the arrow direction, use a stopper ring removal tool to remove the Stopper Ring [2]. Now you can remove the Grip [3], Ball Holder [4], Steel Ball D7.0 [23], Holder Plate [5], Holder Spring [6] and Washer (B) [7] from the Cylinder [25].



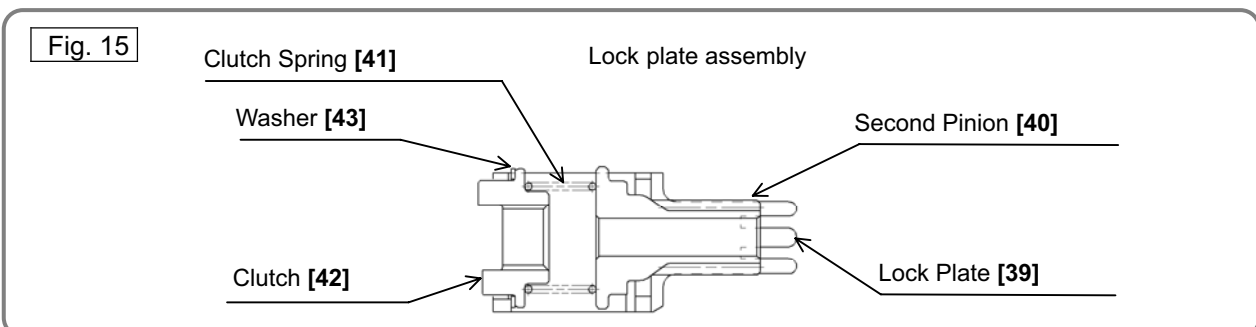
#### 2. Disassembly of the hammering mechanism

Set the Change Lever [17] to "rotation and hammering" ( **IT** marks), remove the Tapping Screws (W/Flange) D4 x 30 (black) [9] from the Gear Cover (A) [10], and then remove the Gear Cover (A) [10]. Leave the lock plate assembly mounted in the removed Gear Cover (A) [10].

Turn the Second Shaft [44] until the Piston [35] moves to the top dead center (on the Inner Cover Ass'y (A) [52] side). The arm of the Reciprocating Bearing [45] can be removed from the Piston Pin [37], and parts fitted onto the Second Shaft [44] can be removed together from the Inner Cover Ass'y (A) [52].

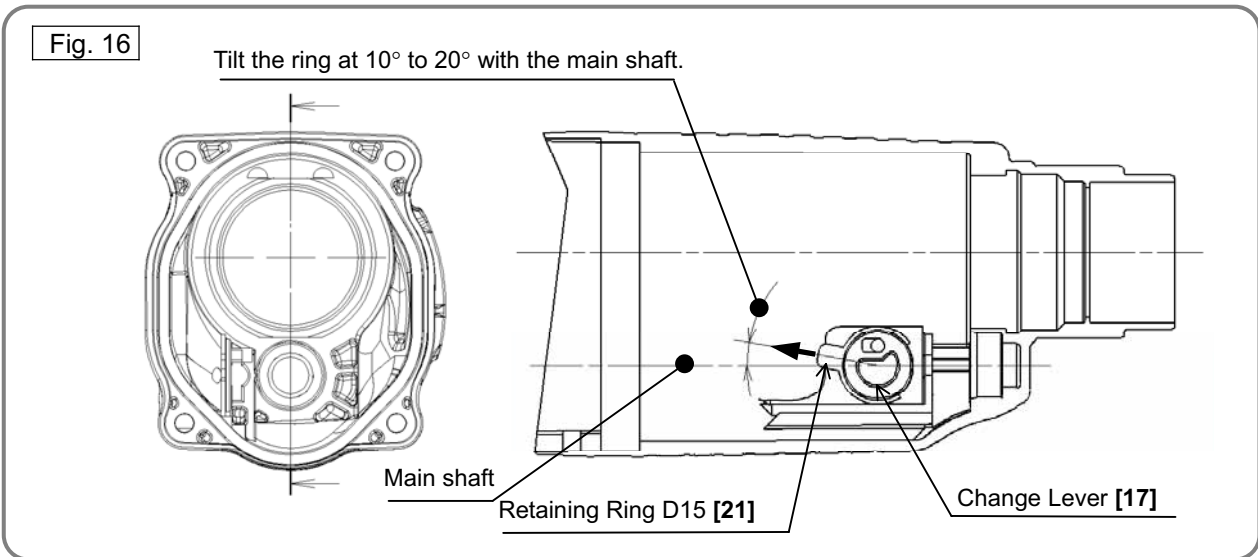
Use a bearing removal tool to remove the First Gear [46] from the Second Shaft [44], and then remove the Reciprocating Bearing [45] from the Second Shaft [44].

Note carefully that the First Gear [46] is positioned for press-fitting with reference to the 9-mm-diameter end face of the Second Shaft [44].



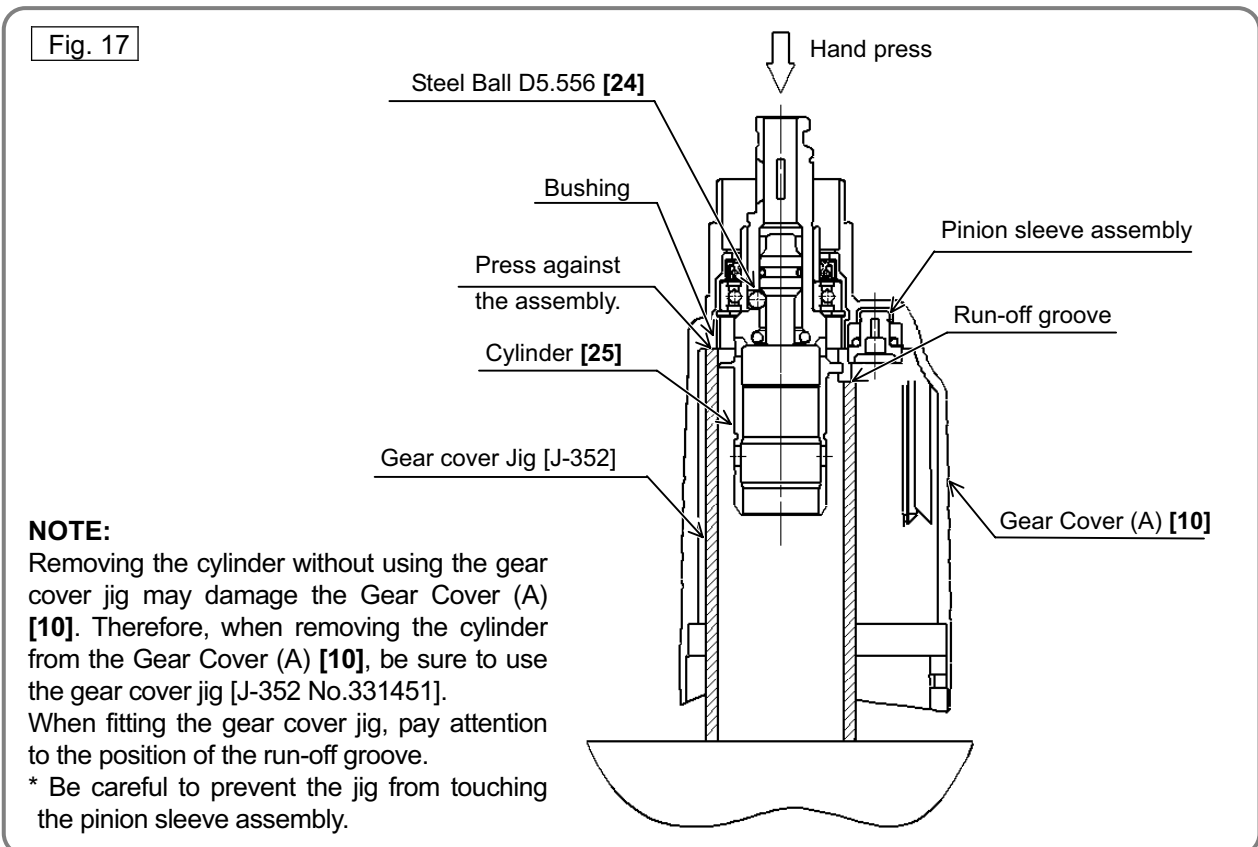
### 3. Removal of Retaining Ring D15

To remove the Retaining Ring D15 [21] from the Change Lever [17], use pliers to pull the ring out in the arrow direction, while keeping it tilted at an angle of 10 to 20 degrees relative to the main shaft as shown in Fig. 16. After removing the Gear Cover (A) [10] from the Change Lever [17], you can remove the lock plate assembly from the Gear Cover (A) [10].



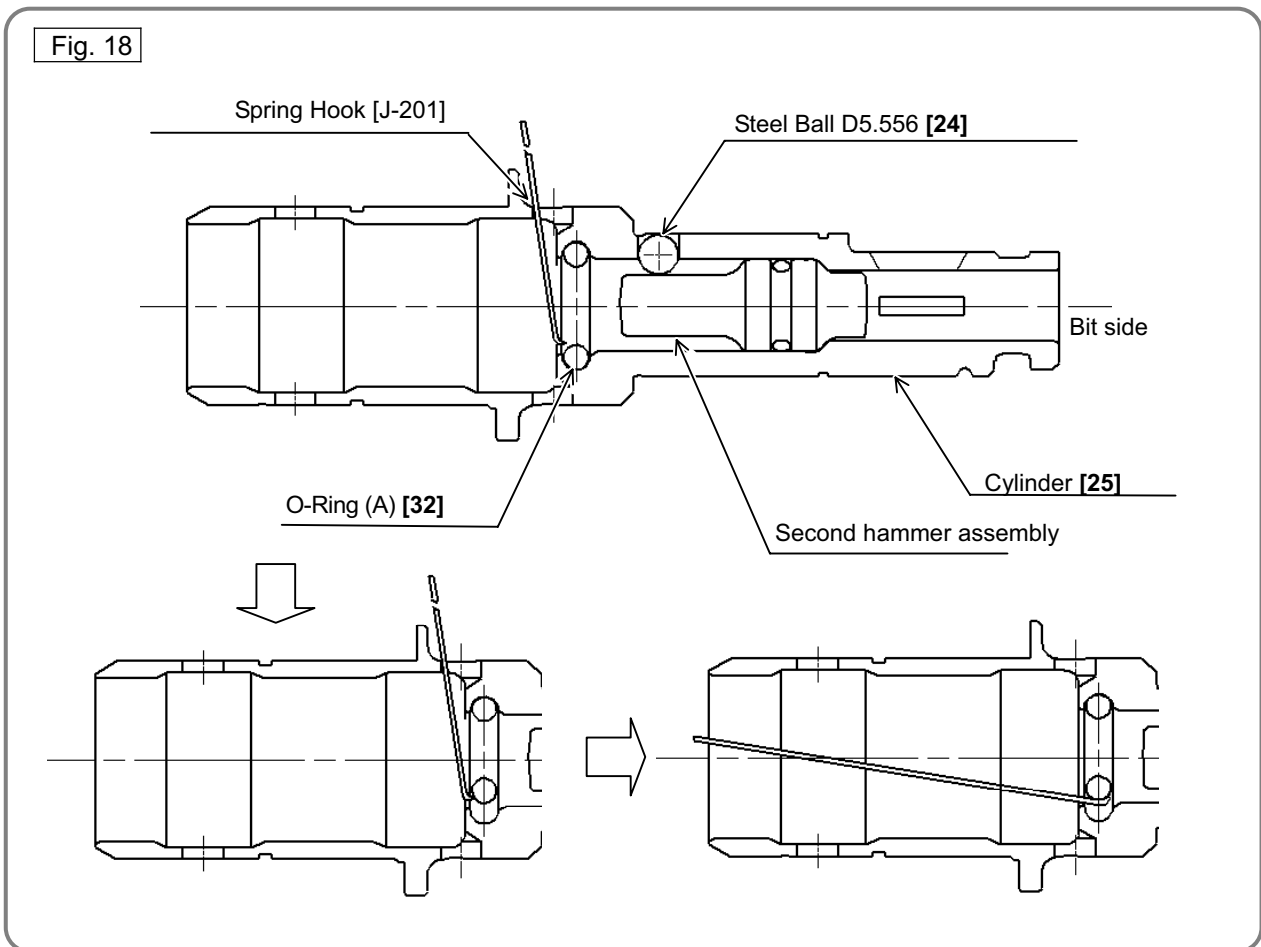
### 4. Disassembly of the Gear Cover

Use a stopper ring removal tool to remove the Retaining Ring for D20 Shaft [8]. Then use the tool to remove the Retaining Ring D28 [29] from the Cylinder [25]. Now you can remove the Washer (A) [28], Spring (A) [27] and Second Gear [26] from the Cylinder [25]. In this state, hold the Gear Cover (A) [10] in an upright position, and then use the Gear Cover J [J-352 No. 331451] and hand press to remove the Cylinder [25] from the Gear Cover (A) [10]. The Sleeve [13] can then be removed from the Cylinder [25]. After removing the Cylinder [25] from the Gear Cover (A) [10], be careful not to lose the Steel Balls D5.556 [24] (3 pieces).



## 5. Disassembly of the Cylinder

Remove the Steel Balls D5.556 [24] (3 pieces) from the cylinder, insert the Spring Hook [J-201 No. 970977] into the Cylinder [25] from the hole in the cylinder, and then disengage the O-Ring (A) [32] from inside the cylinder with a spring hook. You can remove the second hammer assembly from the Cylinder [25] by pushing out the second hammer assembly from the bit side of the cylinder.





# Reassembly

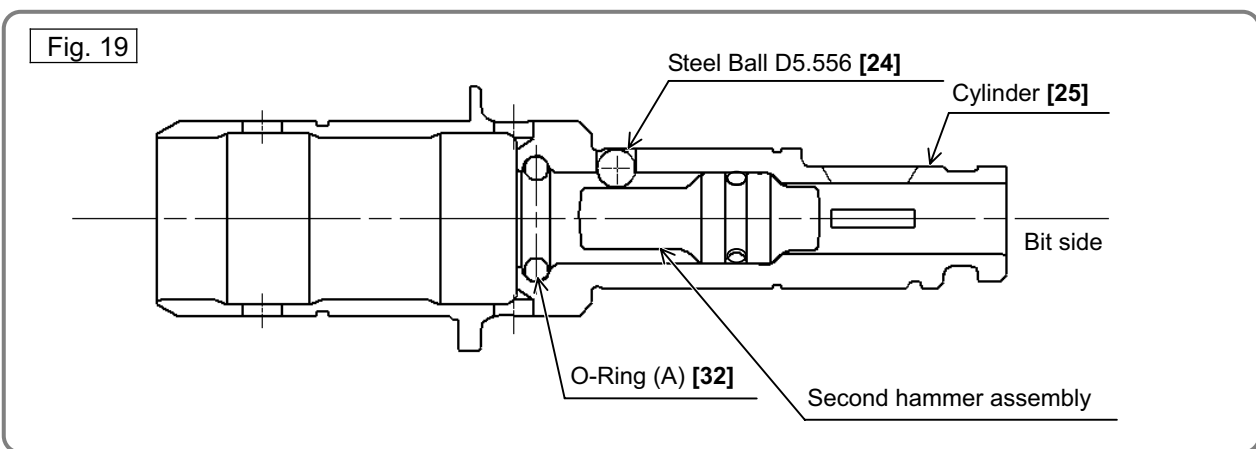
Perform reassembly by reversing the order of the disassembly procedure. However, special attention should be given to the following items.

## 1. Reassembly of the Cylinder


Insert the second hammer assembly into the Cylinder [25], and push it into the bit side of the cylinder. Insert the O-Ring (A) [32] into the Cylinder [25] until it fits inside the cylinder, and then insert the Steel Balls D5.556 [24] (3 pieces) from the hole in the cylinder wall. Be sure to apply grease to prevent the inserted Steel Balls D5.556 [24] (3 pieces) from falling out.

Note the following when reassembling the cylinder:

- The second hammer assembly can be inserted into the Cylinder [25] only prior to inserting the O-Ring (A) [32] into the cylinder.
- The Steel Balls D5.556 [24] (3 pieces) can be inserted only after the second hammer assembly has been pushed into the bit side of the cylinder.



## 2. Inserting the Change Lever assembly

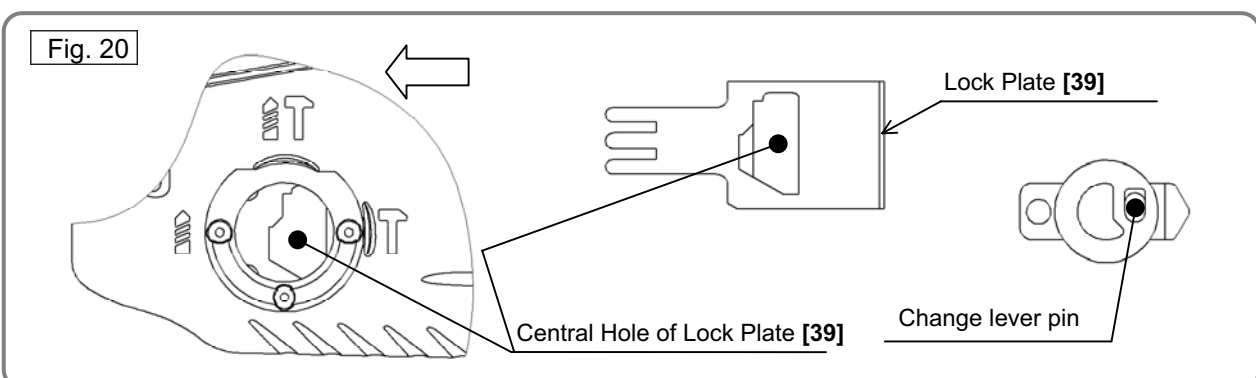
Insert the change lever assembly into the gear cover while aligning the change lever with "rotation" (  ) mark.

Note the following when inserting the change lever assembly:

- Always insert the Spring (C) [22] into the gear cover.
- When inserting the change lever assembly into the gear cover, push the Lock Plate [39] in the arrow direction so that the change lever pin fits into the central hole in the Lock Plate [39].
- When inserting the change level assembly, be careful to prevent the Spring (H) [19] and Steel Ball D3.97 [20] (to be located between the change lever assembly and gear cover) from falling out.

Confirm that the Retaining Ring D15 [21] groove on the Change Lever [17] can be seen inside the gear cover, and then insert the Retaining Ring D15 [21] by pushing it into the groove. For easy insertion, use pliers to insert the Retaining Ring D15 [21], while keeping it tilted at an angle of 10 to 20 degrees relative to the main shaft.

After inserting the Retaining Ring D15 [21], check that the Retaining Ring D15 [21] can rotate smoothly. (Check also that the Retaining Ring D15 has been fitted correctly.)



### 3. Press-fitting the First Gear

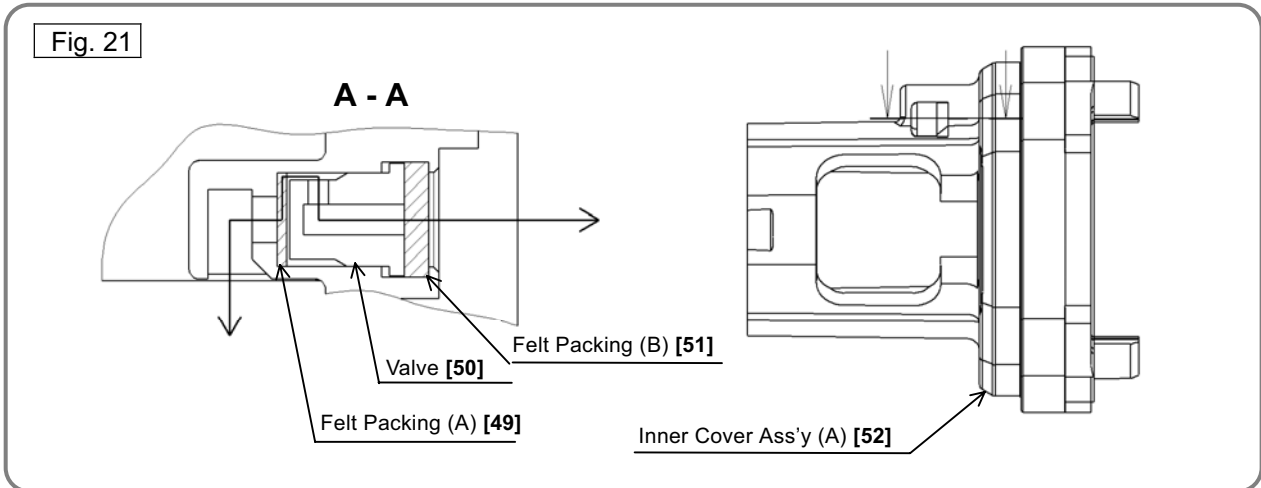
Press-fit the First Gear [46] while aligning it with the end face of the Second Shaft [44]. After press-fitting the First Gear [46], check that the inner ring of the Reciprocating Bearing [45] can rotate smoothly.

### 4. Attaching the Oil Seal

When reassembling the Oil Seal [12], apply grease to inside of the Oil Seal [12]. However, do not apply grease to its periphery. Press-fit the Oil Seal [12] while being careful not to tilt it.

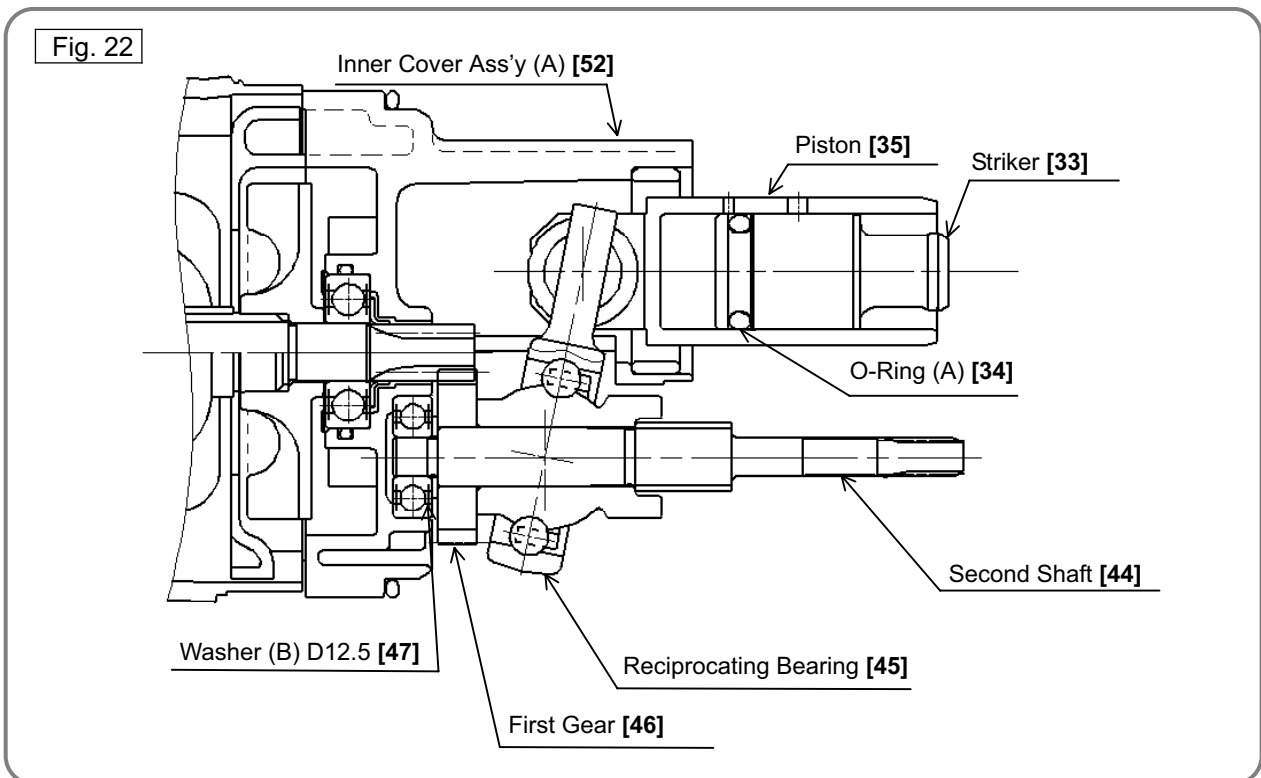
### 5. Reassembly of the internal pressure regulating mechanism

Push the Felt Packing (A) [49], Valve [50] and Felt Packing (B) [51] in this order into the Inner Cover Ass'y (A) [52] so that all are tightly fitted in place.




### 6. Mounting the Piston

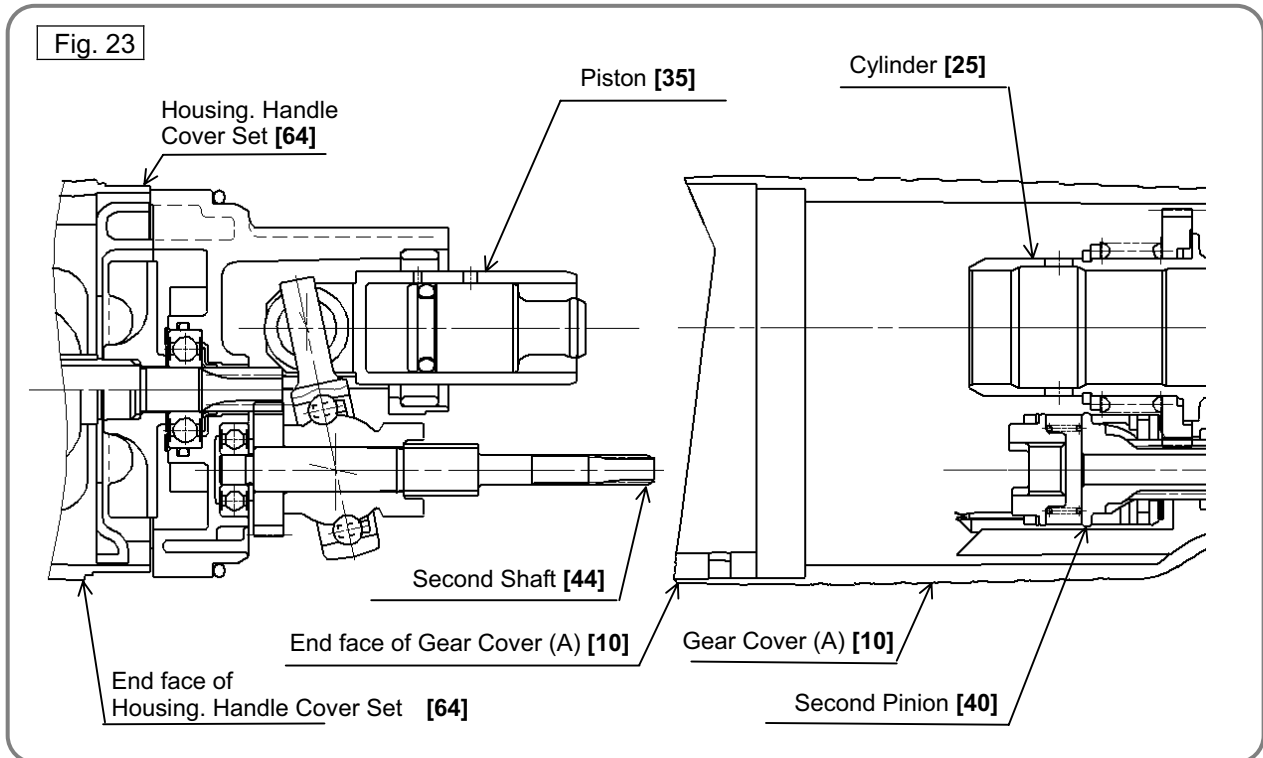
Mount the Piston [35] as shown in Fig. 22.



## 7. Mounting the Gear Cover (A) assembly

After assembling parts into the unit as shown in Fig. 23, confirm that the change lever is set to "rotation" (  mark), and then move the Piston [35] to dead center. Then mount the Gear Cover (A) [10] over the assembled unit while paying attention to the positions of the Piston [35] shaft, Cylinder [25] shaft, Second Shaft [44] and Second Pinion [40] shaft. When the Second Shaft [44] touches the pinion sleeve assembly, turn the Grip [3] to engage the Second Shaft [44], Second Pinion [40], Second Gear [26] and pinion sleeve assembly with one another, and then place the end faces of the Gear Cover (A) [10] assembly and Housing. Handle Cover Set [64] into contact with each other.

Turn the Grip [3] and confirm that movement of the Cylinder [25] is transmitted to the armature shaft.

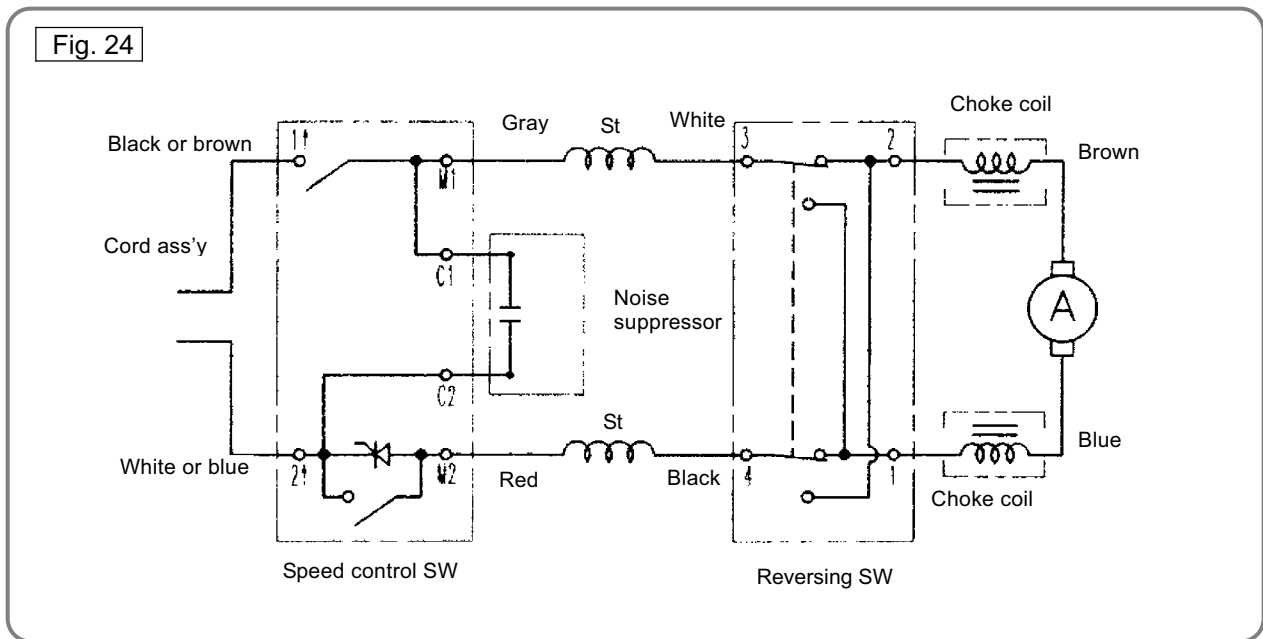


## 8. Tightening torque

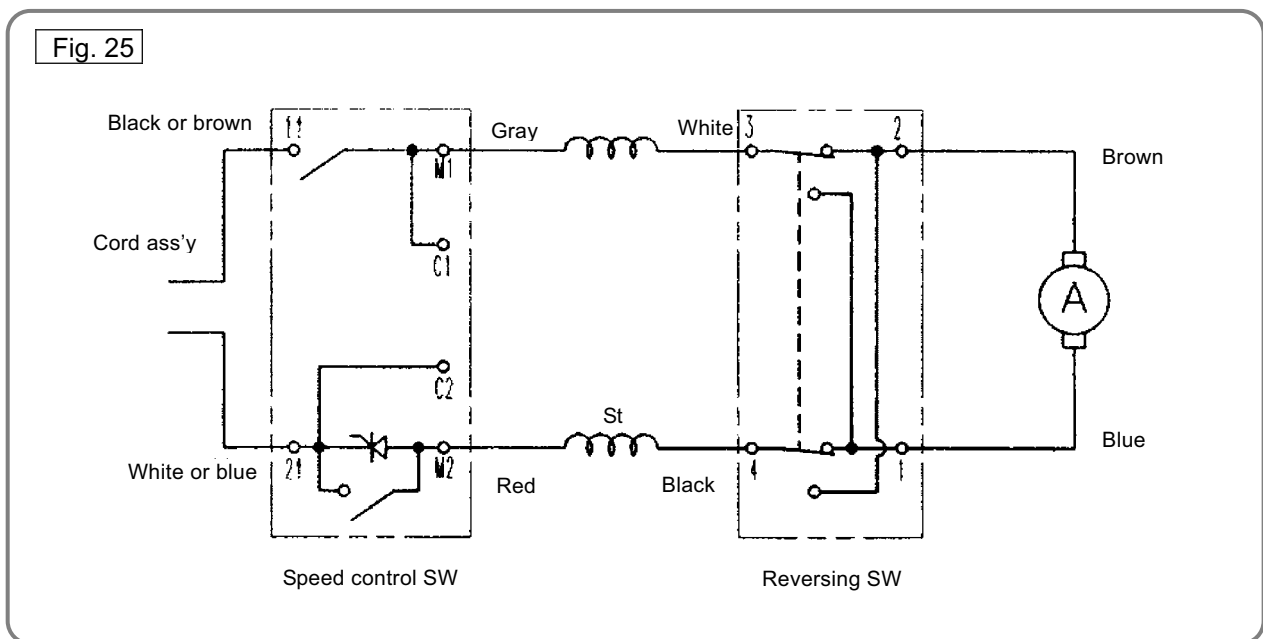
- Tapping Screw D4 [9] [59] [77] [79]-----1.47 – 2.45 N·m (15 – 25 kgf·cm)

## 9. Wiring diagrams

### (1) Product with noise suppressor



### (2) Product without noise suppressor

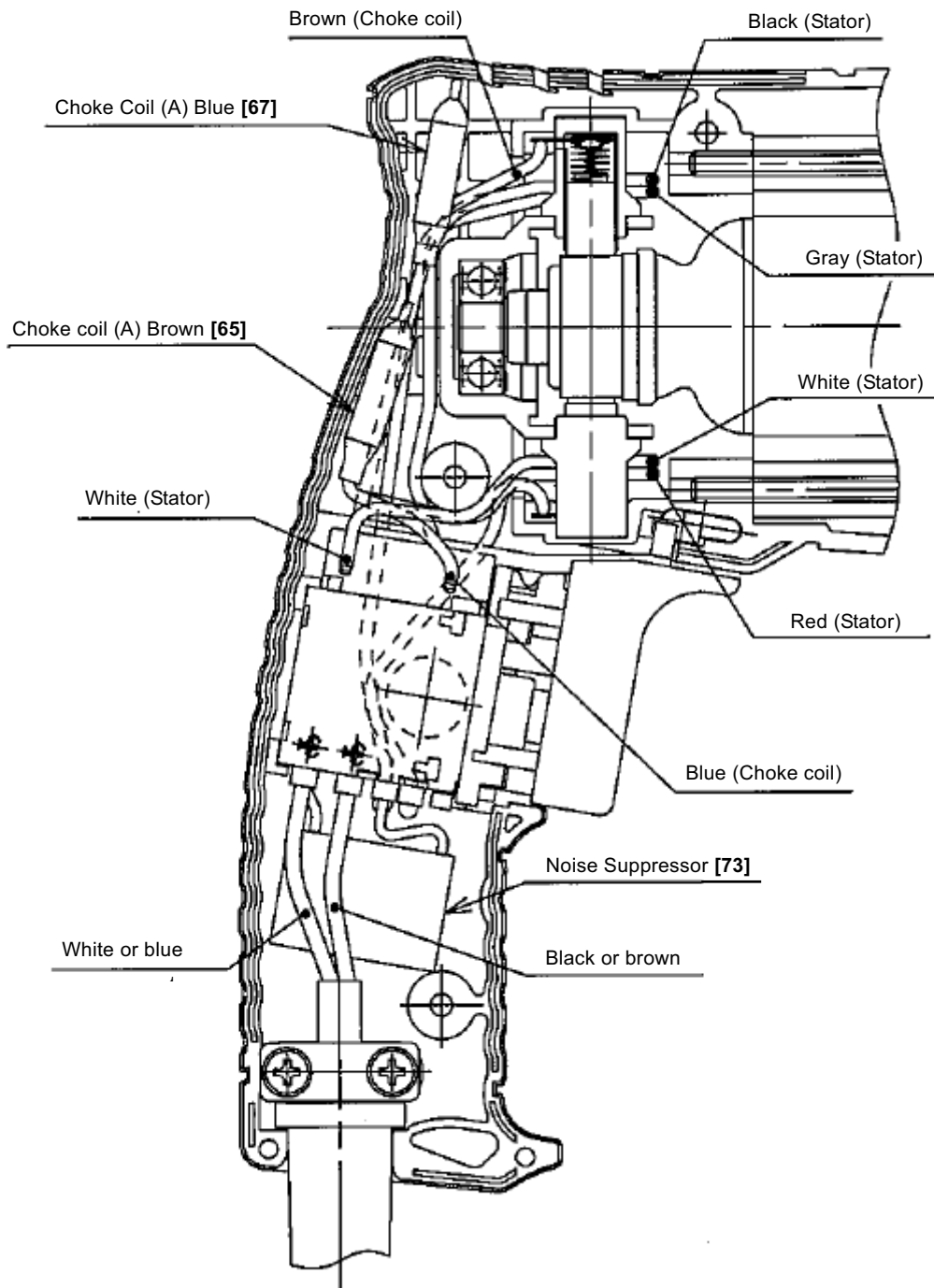


## 10. Internal wire arrangement and wiring work

### A. Internal wire arrangement

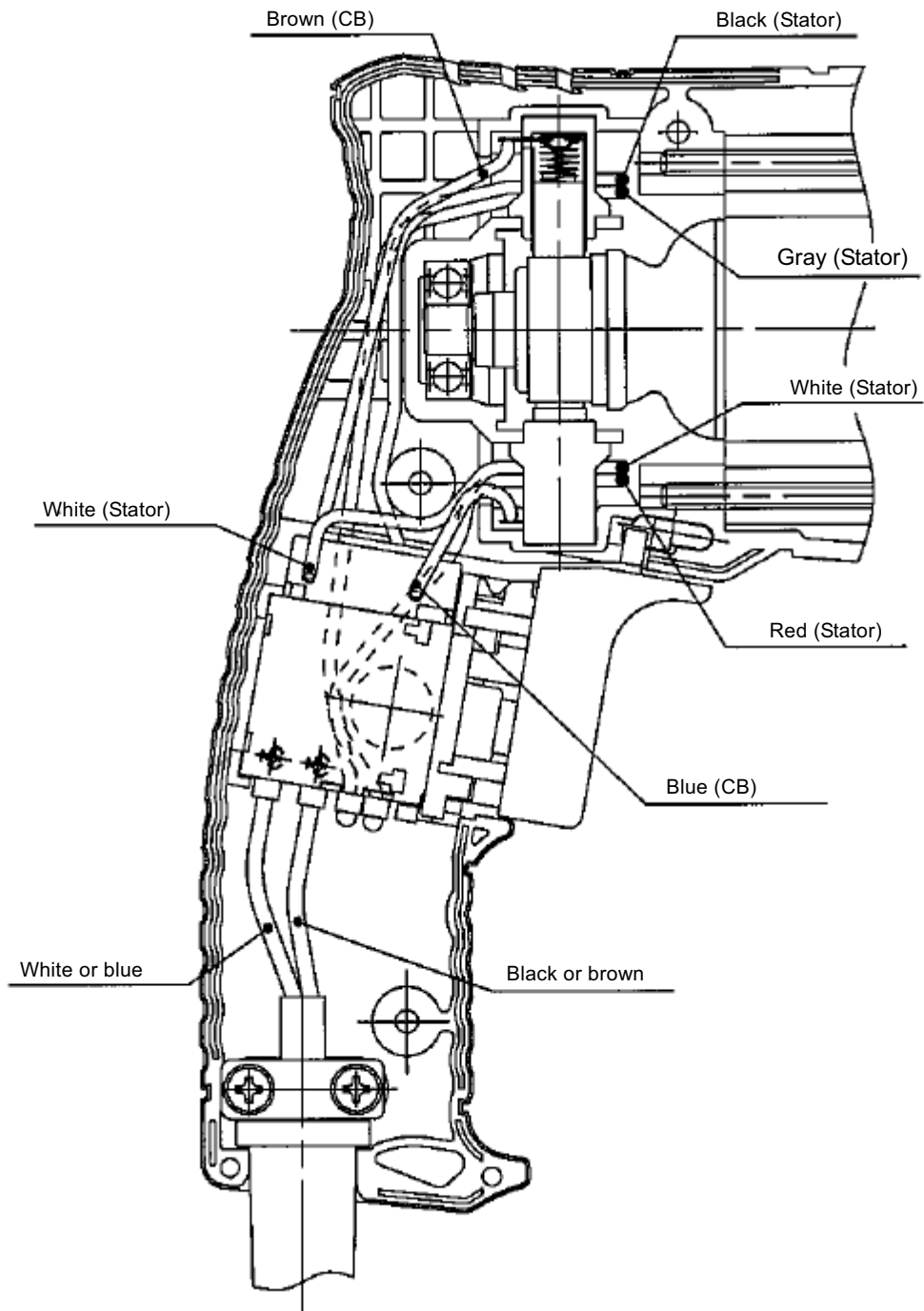
(1) Product with noise suppressor

Fig. 26



(2) Product without noise suppressor

Fig. 27



## B. Additional wiring work

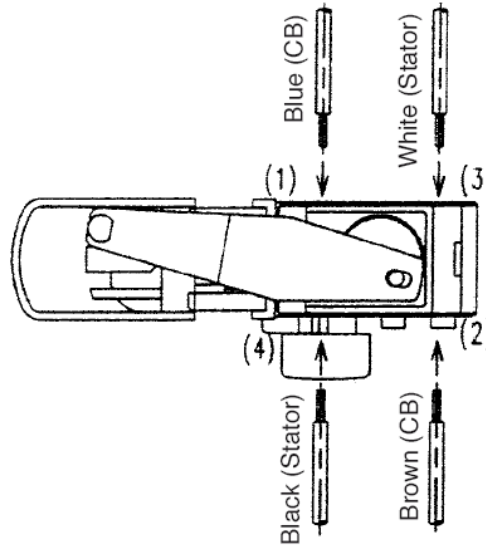
General internal wiring can be performed by referring to the wiring diagrams in Section 9 above. The following are special instructions on switch connections.

### (1) Wiring of the reversing switch

Insert the lead wire (black) protruding from the stator into terminal (4) of the reversing switch, and then insert the lead wire (white) into terminal (3) as shown in Fig. 28. Insert the lead wire (brown) protruding from the carbon brush or choke coil into terminal (2), and then insert the lead wire (blue) into terminal (1). After inserting the wires, slightly pull each lead wire to confirm that the lead wires do not come off. To disconnect the lead wires, insert a small flat-blade screwdriver into the openings near the terminals and pull out the lead wires.

Fig. 28

- Wiring of reversing switch



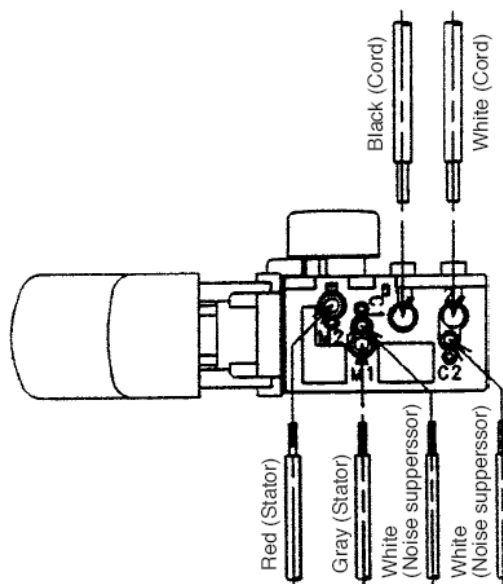
### (2) Wiring of the speed control switch

Insert each cord into terminals (1 ↑) and (2 ↑) of the speed control switch as shown in Fig. 29, and then 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) protruding from the stator into terminal (M1), and then insert the lead wire (red) into terminal (M2). Insert each lead wire (white) protruding from the noise suppressor into terminals (C1) and (C2). After inserting the wires, slightly pull each lead wire to confirm that the lead wires do not come off. To disconnect the lead wires, insert a small flat-blade screwdriver into the openings near the terminals and pull out the lead wires.

Fig. 29

- Wiring of speed control switch



## 11. Insulation tests

Upon the completion of disassembly and repair, measure the insulation resistance and conduct a dielectric strength test.

Insulation resistance: 7 M  $\Omega$  or more using a 500 VDC megohm tester

Dielectric strength : 4,000 VAC/minute, with no abnormalities for 220 V – 240 V  
(110 V for U.K. products)

: 2,500 VAC/minute, with no abnormalities for 110 V - 120 V (Except for U.K. products)

## 12. No-load current values

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

Voltage (V)	110	120	220	230	240
Current (A) max.	3.0	2.8	1.6	1.5	1.4



# STANDARD REPAIR TIME (UNIT) SCHEDULES

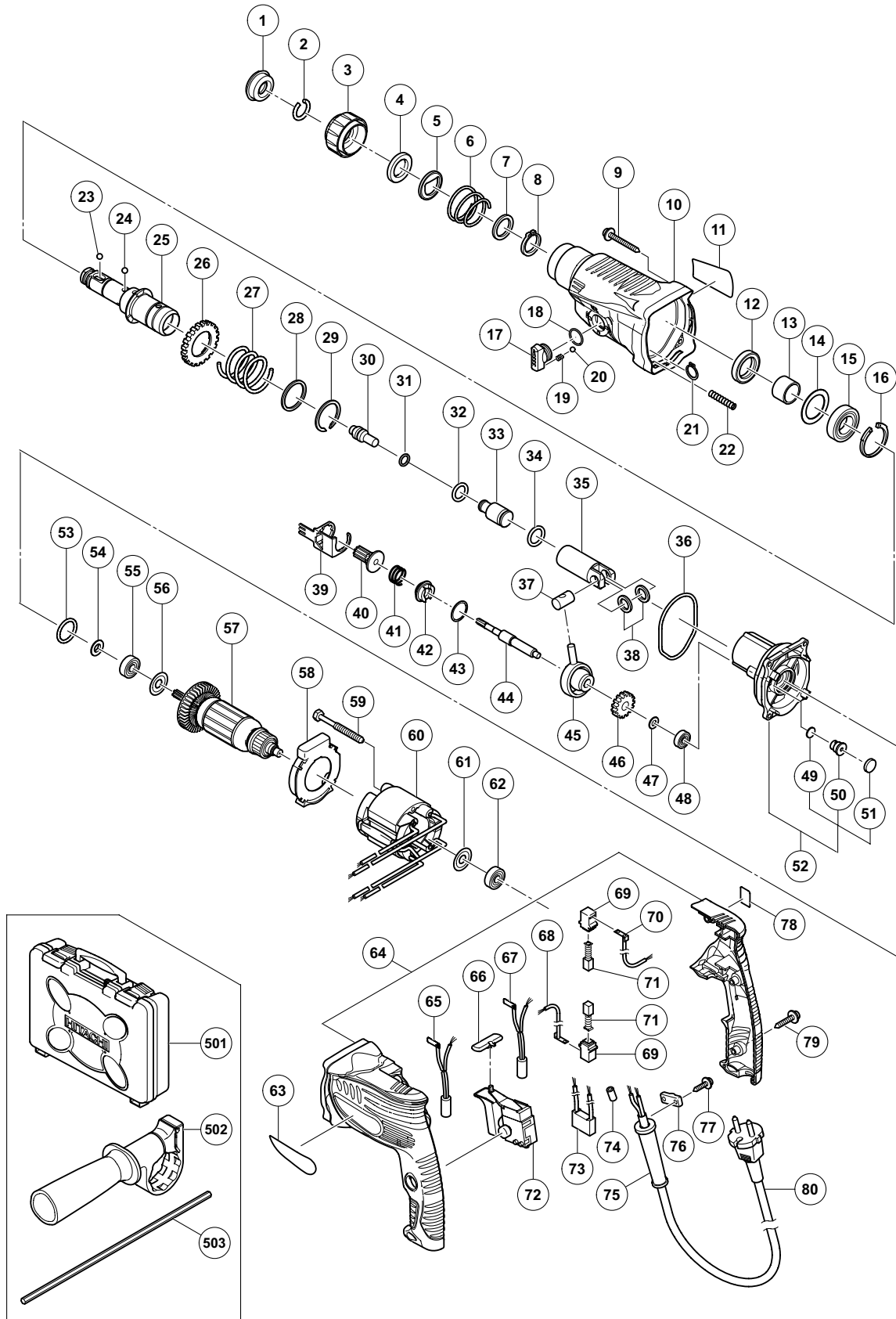
MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
DH22PH	Work Flow							
			Cord Armor	Switch Cord				
						Housing. Handle Cover Set		
					Armature Ass'y O-ring (S-24) Ball Bearing 609DDC3PS2-L Ball Bearing 608VVC2PS2L	Stator		
		General Assembly	Front Cap Grip Ball Holder Holder Spring Steel Ball D7.0	Change Lever O-ring (S-15)		Second Hammer O-ring (B)	Cylinder Second Gear Spring (A)	
						Gear Cover (A) Oil Seal Ball Bearing 6904DDPS2L		
				Striker O-ring (A) Piston O-ring (A) Piston Pin Washer (C)	Inner Cover Ass'y (A) Second Shaft Reciprocating Bearing First Gear Ball Bearing 626VVC2PS2L Clutch Clutch Spring Lock Plate Second Pinion			

## ELECTRIC TOOL PARTS LIST

### ■ ROTARY HAMMER Model DH 22PH

2009·6·19

(E1)



**PARTS**

DH 22PH

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
1	306-345	FRONT CAP	1	
2	306-340	STOPPER RING	1	
3	325-597	GRIP	1	
4	327-879	BALL HOLDER	1	
5	324-526	HOLDER PLATE	1	
6	322-812	HOLDER SPRING	1	
7	984-118	WASHER (B)	1	
8	939-547	RETAINING RING FOR D20 SHAFT (10 PCS.)	1	
9	305-490	TAPPING SCREW (W/FLANGE) D4 X 30 (BLACK)	4	
10	331-520	GEAR COVER (A)	1	
11		NAME PLATE	1	
12	307-688	OIL SEAL	1	
13	331-301	SLEEVE	1	
14	323-232	FELT PACKING (B)	1	
15	690-4DD	BALL BEARING 6904DDPS2L	1	
16	322-813	RETAINING RING 37MM	1	
17	331-303	CHANGE LEVER	1	
18	319-567	O-RING (S-15)	1	
19	331-306	SPRING (H)	1	
20	959-155	STEEL BALL D3.97 (10 PCS.)	1	
21	331-305	RETAINING RING D15	1	
22	331-302	SPRING (C)	1	
23	959-156	STEEL BALL D7.0 (10 PCS.)	1	
24	959-154	STEEL BALL D5.556 (10 PCS.)	3	
25	331-307	CYLINDER	1	
26	331-309	SECOND GEAR	1	
27	331-310	SPRING (A)	1	
28	331-311	WASHER (A)	1	
29	320-846	RETAINING RING D28	1	
30	331-312	SECOND HAMMER	1	
31	301-672	O-RING (B)	1	
32	331-308	O-RING (A)	1	
33	331-296	STRIKER	1	
34	301-670	O-RING (A)	1	
35	331-300	PISTON	1	
36	327-870	O-RING (A)	1	
37	322-798	PISTON PIN	1	
38	322-799	WASHER (C)	2	
39	331-313	LOCK PLATE	1	
40	323-181	SECOND PINION	1	
41	323-182	CLUTCH SPRING	1	
42	331-314	CLUTCH	1	
43	331-315	WASHER	1	
44	331-297	SECOND SHAFT	1	
45	331-298	RECIPROCATING BEARING	1	
46	331-299	FIRST GEAR	1	
47	995-634	WASHER (B) D12.5	1	
48	626-VVM	BALL BEARING 626VVC2PS2L	1	
49	324-543	FELT PACKING (A)	1	
50	324-545	VALVE	1	

**PARTS**

DH 22PH

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
51	324-544	FELT PACKING (B)	1	
52	331-521	INNER COVER ASS'Y (A)	1	INCLUD. 49-51
53	878-609	O-RING (S-24)	1	
54	306-312	FRINGER	1	
55	609-DDC	BALL BEARING 609DDC3PS2-L	1	
56	958-915	WASHER (A)	1	
* 57	360-798U	ARMATURE ASS'Y 110V-120V	1	INCLUD. 54-56, 61, 62
* 57	360-798E	ARMATURE 220V-230V	1	
* 57	360-798F	ARMATURE 240V	1	
58	327-868	FAN GUIDE	1	
59	981-824	HEX. HD. TAPPING SCREW D4 X 45	2	
* 60	340-701C	STATOR 110V-120V	1	
* 60	340-701G	STATOR 110V	1	FOR TPE
* 60	340-701E	STATOR 220V-230V	1	
* 60	340-701F	STATOR 240V	1	
61	982-631	WASHER (A)	1	
62	608-VVM	BALL BEARING 608VVC2PS2L	1	
63		HITACHI LABEL	1	
64	331-669	HOUSING. HANDLE COVER SET	1	
* 65	324-549	CHOKE COIL (A) BROWN	1	EXCEPT FOR VEN, THA, IND, SYR, INA, SIN, KUW, USA, CAN, MEX, HKG
66	322-853	PUSHING BUTTON	1	
* 67	324-551	CHOKE COIL (A) BLUE	1	EXCEPT FOR VEN, THA, IND, SYR, INA, SIN, KUW, USA, CAN, MEX, HKG
* 68	324-538	INTERNAL WIRE (A) (BLUE)	1	FOR VEN, THA, IND, SYR, INA, SIN, KUW, USA, CAN, MEX, HKG
69	955-203	BRUSH HOLDER	2	
* 70	324-537	INTERNAL WIRE (A) (BROWN)	1	FOR VEN, THA, IND, SYR, INA, SIN, KUW, USA, CAN, MEX, HKG
71	999-041	CARBON BRUSH (1 PAIR)	2	
72	331-454	SWITCH (1P PILLAR TYPE)	1	
* 73	930-039	NOISE SUPPRESSOR	1	EXCEPT FOR VEN, THA, IND, SYR, INA, SIN, KUW, USA, CAN, MEX, HKG
* 74	981-373	TUBE (D)	2	FOR CORD
* 75	953-327	CORD ARMOR D8.8	1	
* 75	938-051	CORD ARMOR D10.1	1	
76	937-631	CORD CLIP	1	
77	984-750	TAPPING SCREW (W/FLANGE) D4 X 16	2	
* 78		LABEL (YEARS MARK)	1	FOR CHN
79	301-653	TAPPING SCREW (W/FLANGE) D4 X 20 (BLACK)	3	
* 80	500-390Z	CORD	1	(CORD ARMOR D8.8)
* 80	500-247Z	CORD	1	(CORD ARMOR D8.8) FOR SAF, AUT, FIN, NOR, SWE, DEN
* 80	500-201Z	CORD	1	(CORD ARMOR D10.1) FOR VEN
* 80	500-239Z	CORD	1	(CORD ARMOR D10.1) FOR THA
* 80	500-235Z	CORD	1	(CORD ARMOR D8.8) FOR IND
* 80	500-447Z	CORD	1	(CORD ARMOR D8.8) FOR SYR
* 80	500-234Z	CORD	1	(CORD ARMOR D8.8) FOR INA
* 80	500-423Z	CORD	1	(CORD ARMOR D8.8) FOR SIN
* 80	500-422Z	CORD	1	(CORD ARMOR D8.8) FOR KUW



**OPTIONAL ACCESSORIES**

DH 22PH

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
601	308-471	GREASE FOR HAMMER. HAMMER DRILL (70G)	1	
602	980-927	GREASE FOR HAMMER. HAMMER DRILL (500G)	1	
603	981-840	GREASE (A) FOR HAMMER. HAMMER DRILL (30G)	1	
604	321-814	DRILL CHUCK 13VLRB-D	1	INCLUD. 605
605	995-344	FLAT HD. SCREW (A) (LEFT HAND) M6 X 25	1	
606	971-511Z	+ DRIVER BIT (A) NO. 2 25L	1	
607	971-512Z	+ DRIVER BIT (A) NO. 3 25L	1	
608	981-122	SPECIAL SCREW M6 X 22	1	
609	971-794	ANCHOR SETTING ADAPTER A W1/4" (MANUAL)	1	
610	971-795	ANCHOR SETTING ADAPTER A W5/16" (MANUAL)	1	
611	971-796	ANCHOR SETTING ADAPTER A W3/8" (MANUAL)	1	
612	971-797	ANCHOR SETTING ADAPTER A W1/2" (MANUAL)	1	
613	971-798	ANCHOR SETTING ADAPTER A W5/8" (MANUAL)	1	
614	971-799	ANCHOR SETTING ADAPTER B W1/4" (MANUAL)	1	
615	971-800	ANCHOR SETTING ADAPTER B W5/16" (MANUAL)	1	
616	971-801	ANCHOR SETTING ADAPTER B W3/8" (MANUAL)	1	
617	971-802	ANCHOR SETTING ADAPTER B W1/2" (MANUAL)	1	
618	971-803	ANCHOR SETTING ADAPTER B W5/8" (MANUAL)	1	
619	944-477	COTTER	1	
620	303-046	BULL POINT (SDS+) 250MM (ROUND SHANK TYPE	1	
621	302-976	ANCHOR SETTING ADAPTER A (SDS+) W1/4 X 260L	1	
622	302-975	ANCHOR SETTING ADAPTER A(SDS+) W5/16 X 260L	1	
623	303-621	ANCHOR SETTING ADAPTER A (SDS+) W3/8 X 160L	1	
624	302-974	ANCHOR SETTING ADAPTER A (SDS+) W3/8 X 260L	1	
625	302-979	ANCHOR SETTING ADAPTER B (SDS+) W1/4 X 260L	1	
626	302-978	ANCHOR SETTING ADAPTER B (SDS+) W5/16 X 260L	1	
627	303-622	ANCHOR SETTING ADAPTER B (SDS+) W3/8 X 160L	1	
628	302-977	ANCHOR SETTING ADAPTER B (SDS+) W3/8 X 260L	1	
629	303-334	CHUCK HANDLE	1	
630	930-515	CHUCK WRENCH 10G	1	
631	303-332	HAMMER DRILL CHUCK SET 13MM	1	INCLUD. 632, 633
632	303-334	CHUCK HANDLE	1	
633	303-335	RUBBER CAP	1	
634	321-813	DRILL CHUCK 13VLD-D	1	
635	320-859	SYRINGE (BLOW-OUT BULB TYPE)	1	
636	303-617	TAPER SHANK ADAPTER (SDS PLUS) NO. 1	1	
637	303-618	TAPER SHANK ADAPTER (SDS PLUS) NO. 2	1	
638	303-619	A-TAPER SHANK ADAPTER (SDS PLUS)	1	
639	303-620	B-TAPER SHANK ADAPTER (SDS PLUS)	1	
640	303-624	CHUCK ADAPTER (D) (SDS PLUS)	1	
641	303-623	CHUCK ADAPTER (G) (SDS PLUS)	1	
642	321-825	DRILL CHUCK AND ADAPTER SET	1	
643	306-369	DRILL BIT (SLENDER SHAFT) D3.4 X 90	1	
644	306-368	DRILL BIT (SLENDER SHAFT) D3.5 X 90	1	
645	306-370	ADAPTER FOR SLENDER SHAFT (SDS PLUS)	1	
646	944-460	TAPER SHANK DRILL BIT D11 X 100	1	
647	944-461	TAPER SHANK DRILL BIT D12.3 X 110	1	
648	993-038	TAPER SHANK DRILL BIT D12.7 X 110	1	
649	944-462	TAPER SHANK DRILL BIT D14.3 X 110	1	
650	944-500	TAPER SHANK DRILL BIT D14.5 X 110	1	

