

Models No. ▶ BHR200S

Description ▶ Cordless Rotary Hammer 20mm (3/16")

CONCEPTION AND MAIN APPLICATIONS

The above mentioned model is 20 mm (13/16") cordless rotary hammer. Its brief benefits and features are as follows.

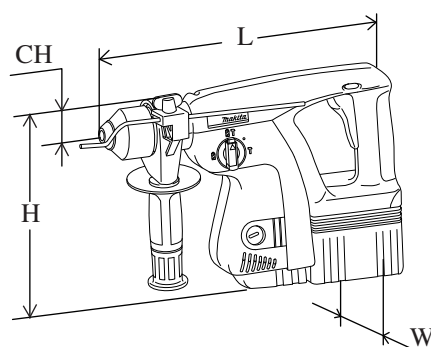
* Equipped with newly developed 24V/3.0Ah Ni-MH battery.

* 3 working modes, they are "rotation with percussion", "percussion only" and "rotation only".

* SDS-plus bit can be used

Below listed standard type model is only available.

Model No.	Battery	Charger	Plastic case
BHR200SF	B2430, Ni-MH 24V/3.0Ah	DC24SA	Yes



Dimensions : mm (")	
Width (W)	86 (3-3/8)
*Height (H)	235 (9-1/4)
Center height (CH)	35 (1-3/8)
Length (L)	316 (12-1/2)

*Height (H) : 210mm (8-1/4") when battery B2417 is attached.

► Specification

Battery	Voltage (V)	24
	*Capacity (Ah)	3.0
	*Energy (Wh)	72
No load speed : (min-1= rpm)		0 - 1,100
Blows per min : (min-1= bpm).		0 - 4,700
Bit type		SDS-plus
Diameter of bit shank : mm (")		10 (3/8)
Capacity : mm (")	Concrete	20 (13/16)
	Steel	13 (1/2)
	Wood	27 (1-1/16)
Reverse switch		Yes
Electric brake		Yes
Clutch		Yes

*Capacity (Ah): 1.7Ah when battery B2417 is attached.

*Energy (Wh) : 40.8Wh when battery B2417 is attached.

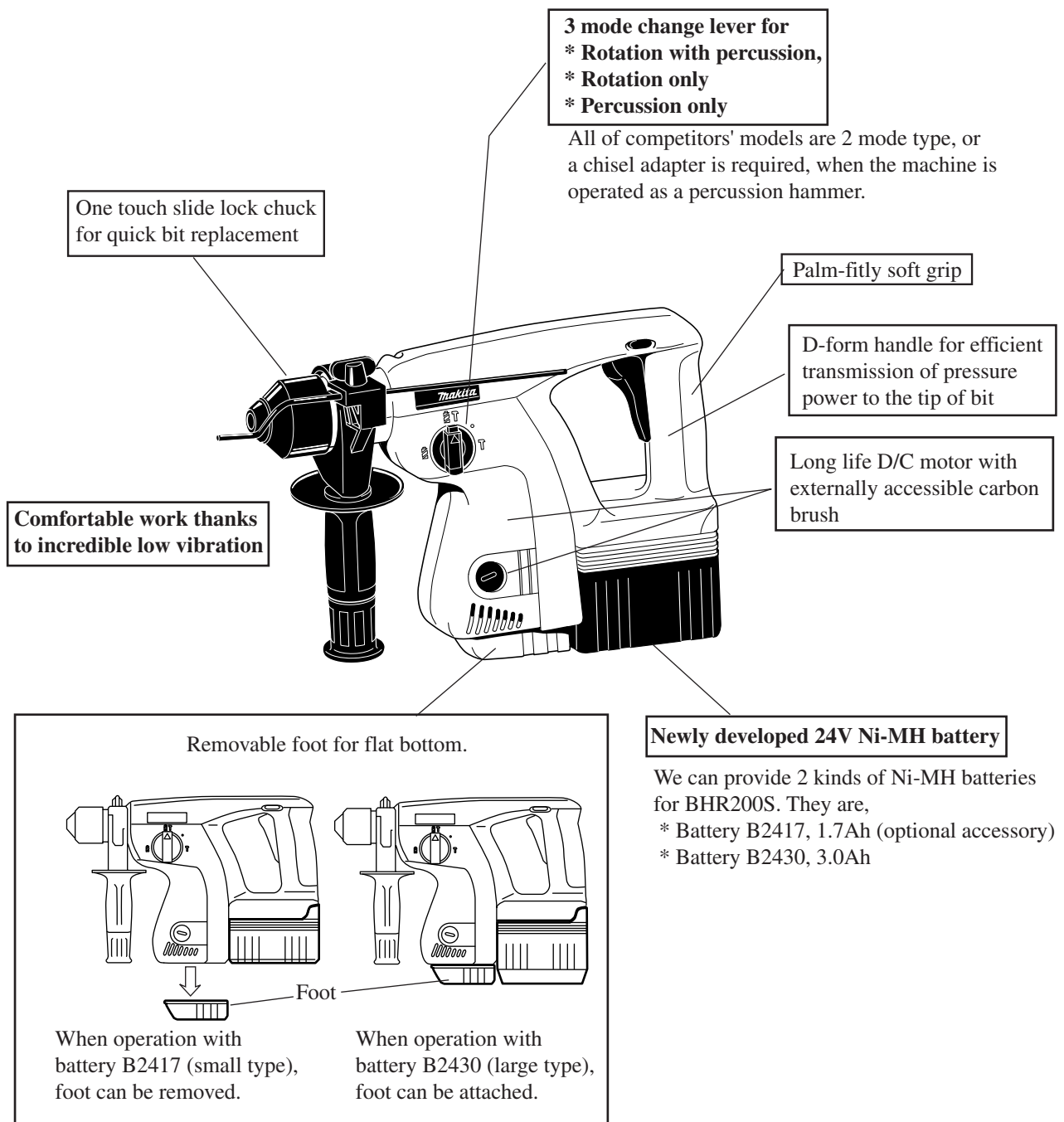
► Standard equipment

- * Depth gauge (Stopper pole) 1 pc.
- * Grease for bit 1 pc.

< Note > The standard equipment for the tool shown may differ from country to country.

► Optional accessories

- * SDS-plus type TCT. hammer bit
4.0mm(5/32") - 20mm(13/16")
- * Bull point
- * Cold chisel
- * Scaling chisel
- * Grooving chisel
- * Drill chuck assembly
- * Chuck key S13
- * Grease for bit
- * Dust cup 5
- * Dust cup 9
- * Blow out bulb
- * Chuck adapter assembly
- * Battery B2430
- * Battery B2417
- * Charger DC24SA
- * Dust extractor attachment
- * Foot for battery B2417



Comparison No.1

Model No.		MAKITA		Competitor A		Competitor B		Competitor C
Spec.		BHR200S		A		B		C
Battery	Voltage (V)	24		24		24		24
	Capacity (Ah)	3.0	1.7	3.0	1.7	2.5	1.7	2.0
	Energy (Wh)	72	40.8	72	40.8	60	40.8	48
	Cell	Ni-MH		Ni-Cd		Ni-Cd		Ni-Cd
	Weight : Kg	1.46	0.98	1.96	1.32	1.95	1.26	1.35
Charging time (min.)		60	30	27	15	65	45	60
Drilling in	concrete : mm (")	20 (13/16)		20 (13/16)		16 (5/8)		20 (13/16)
	steel : mm (")	13 (1/2)		10 (3/8)		—		13 (1/2)
	wood : mm (")	27 (1-1/16)		20 (13/16)		—		30 (1-3/16)
No load speed : (min -1= rpm)		0 - 1,100		0 - 1,000		0 - 820		0 - 1,100
Blows per min : (min -1= bpm).		0 - 4,700		0 - 4,400		0 - 4,010		0 - 4,200
Energy of blow	calculated by our own method	2.1 J		—		2.0 J		2.2 J
	Figure on catalog	2.1 J		1.3 J		2.0 J		2.0 J
Working mode		3 modes		* 2 modes		2 modes		2 modes
Chuck system	One touch slide lock	○		○				○
	Two touch slide lock							
	Revolving lock					○		
Externally accessible carbon brush		Yes		No		No		No
Dimensions	Length : mm (")	316 (12-1/2)	316 (12-1/2)	329 (13)	329 (13)	398 (15-5/8)	398 (15-5/8)	355 (14)
	Height : mm (")	235 (9-1/4)	210 (8-1/4)	233 (9-1/8)	216 (8-1/2)	196 (7-3/4)	196 (7-3/4)	215 (8-1/2)
	Width : mm (")	86 (3-3/8)	86 (3-3/8)	72 (2-13/16)	72 (2-13/16)	116 (4-9/16)	77 (3)	100 (3-15/16)
Weight	measured by us : Kg (lbs)	4.09 (9.02)	3.58 (7.89)	4.18 (9.22)	3.54 (7.80)	4.98 (10.98)	4.29 (9.46)	3.98 (8.77)
	Figure on catalog: Kg (lbs)	4.0 (8.8)	3.5 (7.7)	4.2 (9.3)	3.5 (7.7)	4.8 (10.6)	4.2 (9.3)	4.2 (9.3)
Plastic carrying case		Yes		Yes		Yes		Yes
Standard equipments		Grease for bit Depth gauge		Depth gauge		Dust cup Grease for bit Depth gauge Cleaning cloth		Grease for bit Depth gauge

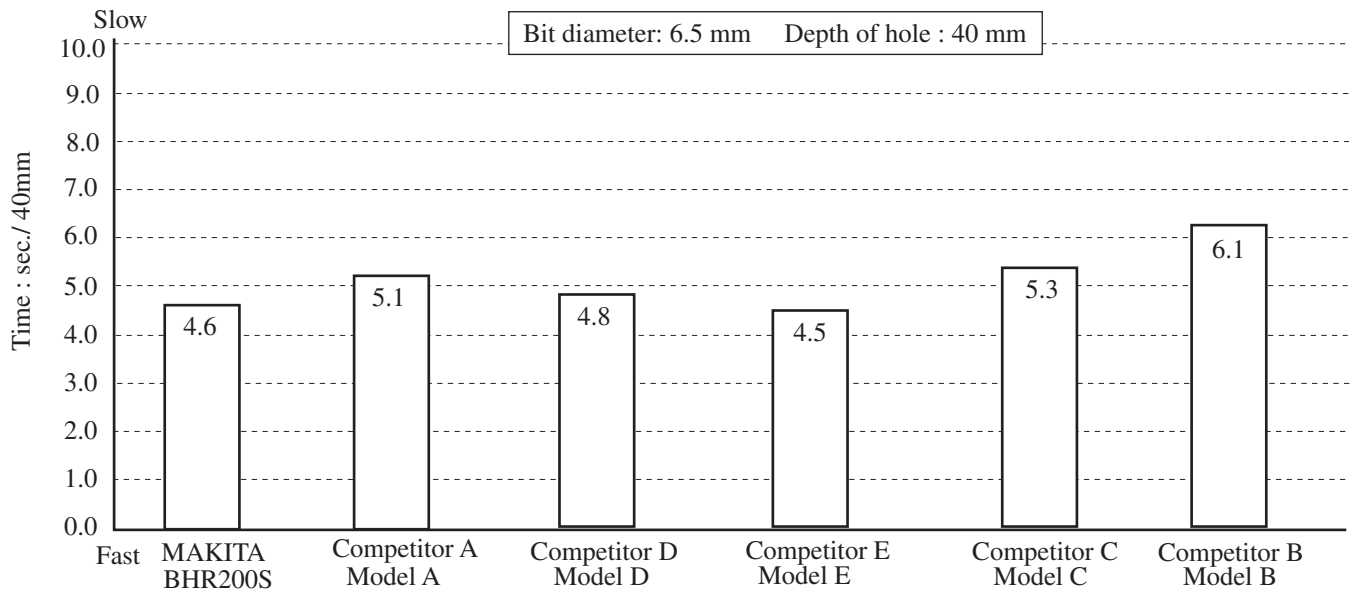
* 2 modes :In case of Competitor A, a chisel adapter (optional accessory) is required to be operated as a demolition hammer.

Comparison No.2

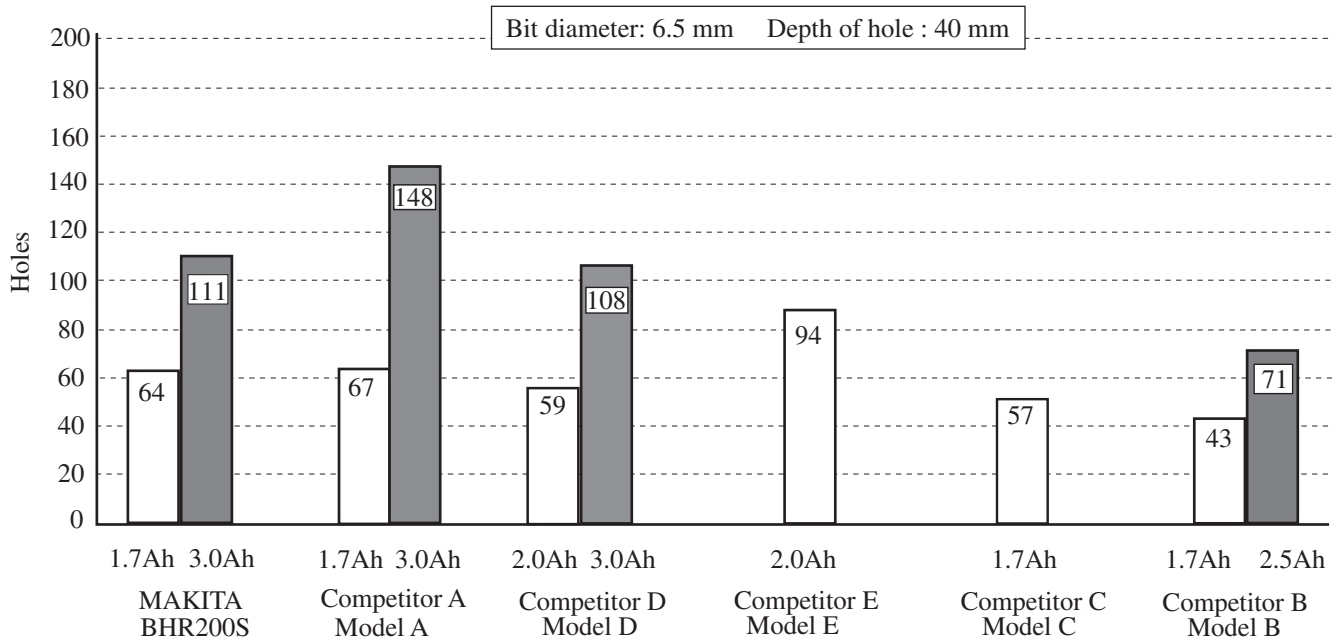
Model No. Spec.		MAKITA		Competitor D		Competitor E
		BHR200S		D		E
Battery	Voltage (V)	24		24		24
	Capacity (Ah)	3.0	1.7	2.0	3.0	2.0
	Energy (Wh)	72	40.8	48	72	48
	Cell	Ni-MH		Ni-Cd	Ni-MH	Ni-Cd
	Weight : Kg	1.46	0.98	1.31	1.4	1.37
Charging time (min.)		60	30	15	22	18
Drilling in	concrete : mm (")	20 (13/16)		20 (13/16)		20 (13/16)
	steel : mm (")	13 (1/2)		—		13 (1/2)
	wood : mm (")	27 (1-1/16)		—		27 (1-1/16)
No load speed : (min -1= rpm)		0 - 1,100		0 - 950		0 - 1,150
Blows per min : (min -1= bpm).		0 - 4,700		0 - 4,600		0 - 4,400
Energy of blow	calculated by our own method	2.1 J		2.9 J		2.2 J
	Figure on catalog	2.1 J		—		—
Working mode		3 modes		2 modes		2 modes
Chuck system	One touch slide lock	○				
	Two touch slide lock					○
	Revolving lock			○		
Externally accessible carbon brush		Yes		No		No
Dimensions	Length : mm (")	316 (12-1/2)	316 (12-1/2)	291 (11-1/2)	291 (11-1/2)	292 (11-1/2)
	Height : mm (")	235 (9-1/4)	210 (8-1/4)	199 (7-7/8)	199 (7-7/8)	210 (8-1/4)
	Width : mm (")	86 (3-3/8)	86 (3-3/8)	68 (2-11/16)	107 (4 -1/4)	100 (3-15/16)
Weight	measured by us : Kg (lbs)	4.09 (9.02)	3.58 (7.89)	3.45 (7.6)	3.54 (7.8)	3.79 (8.36)
	Figure on catalog: Kg (lbs)	4.0 (8.8)	3.5 (7.7)	3.6 (7.9)	3.6 (7.9)	3.7 (8.2)
Plastic carrying case		Yes		Yes		Yes
Standard equipments		Grease for bit Depth gauge		Grease for bit Depth gauge Dust cup		Depth gauge

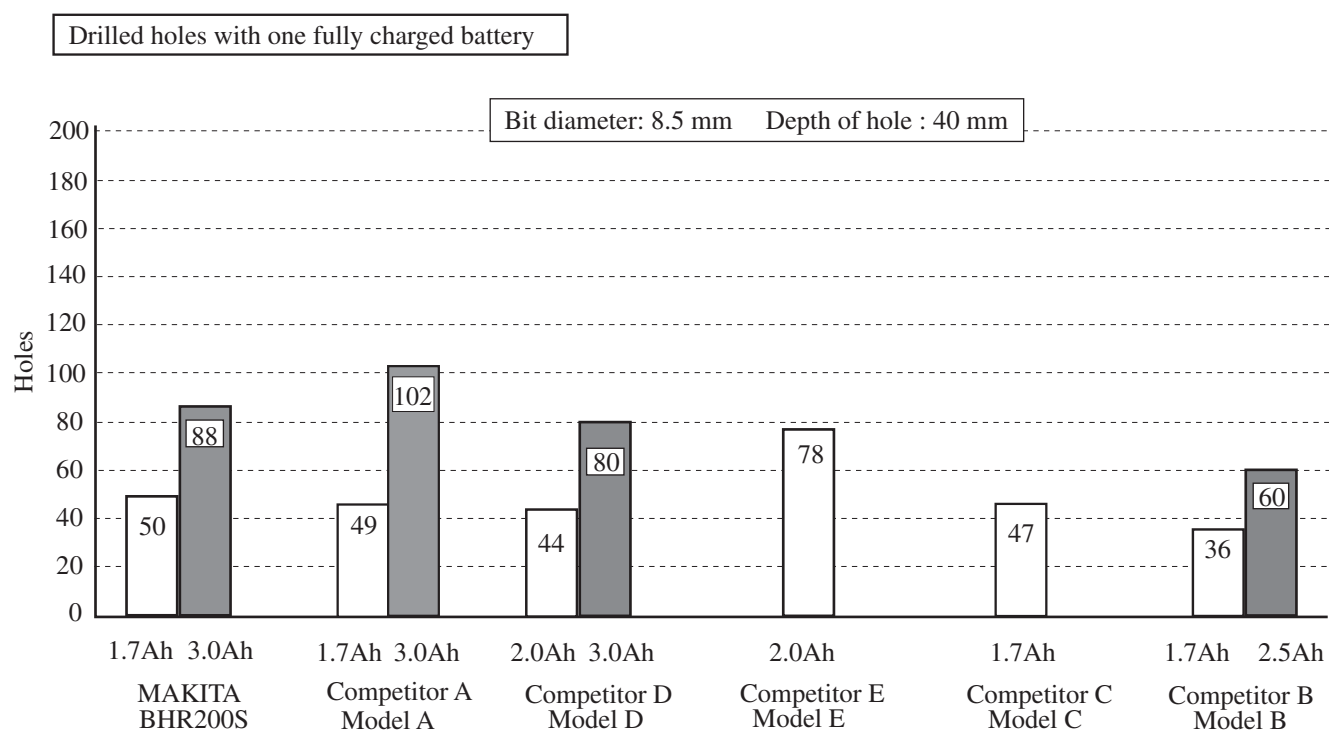
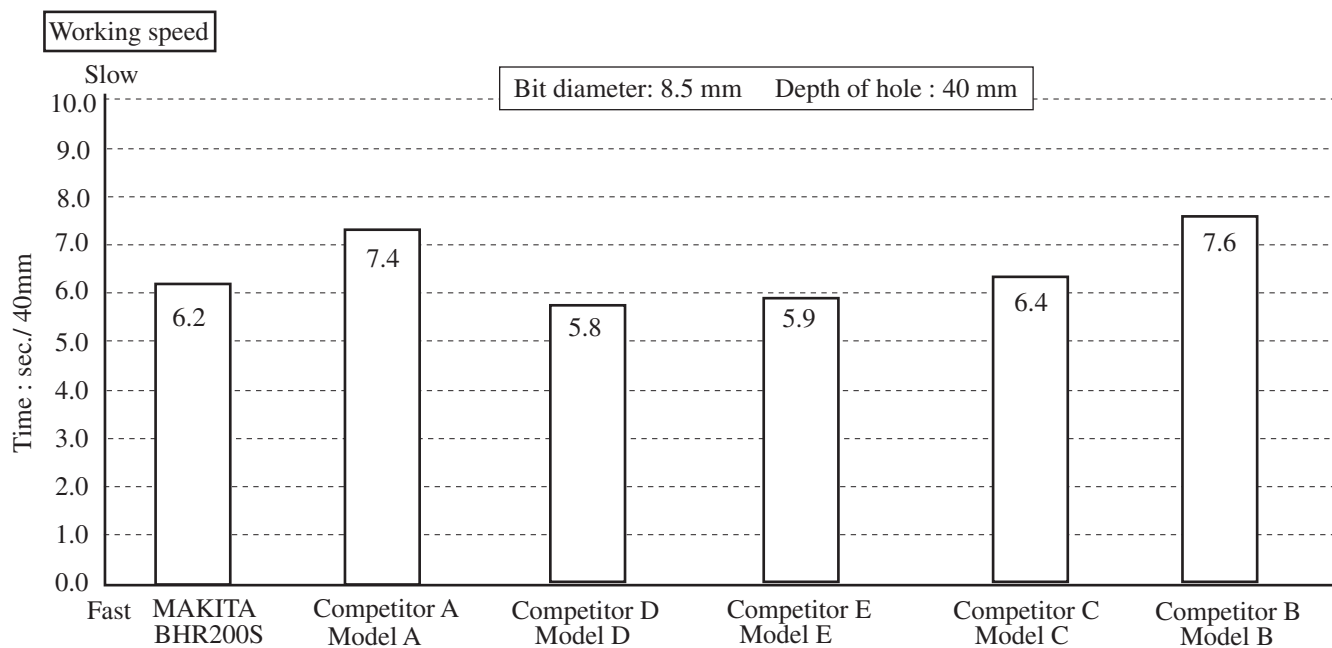
Comparison in working speed, and working amount per one fully charged battery

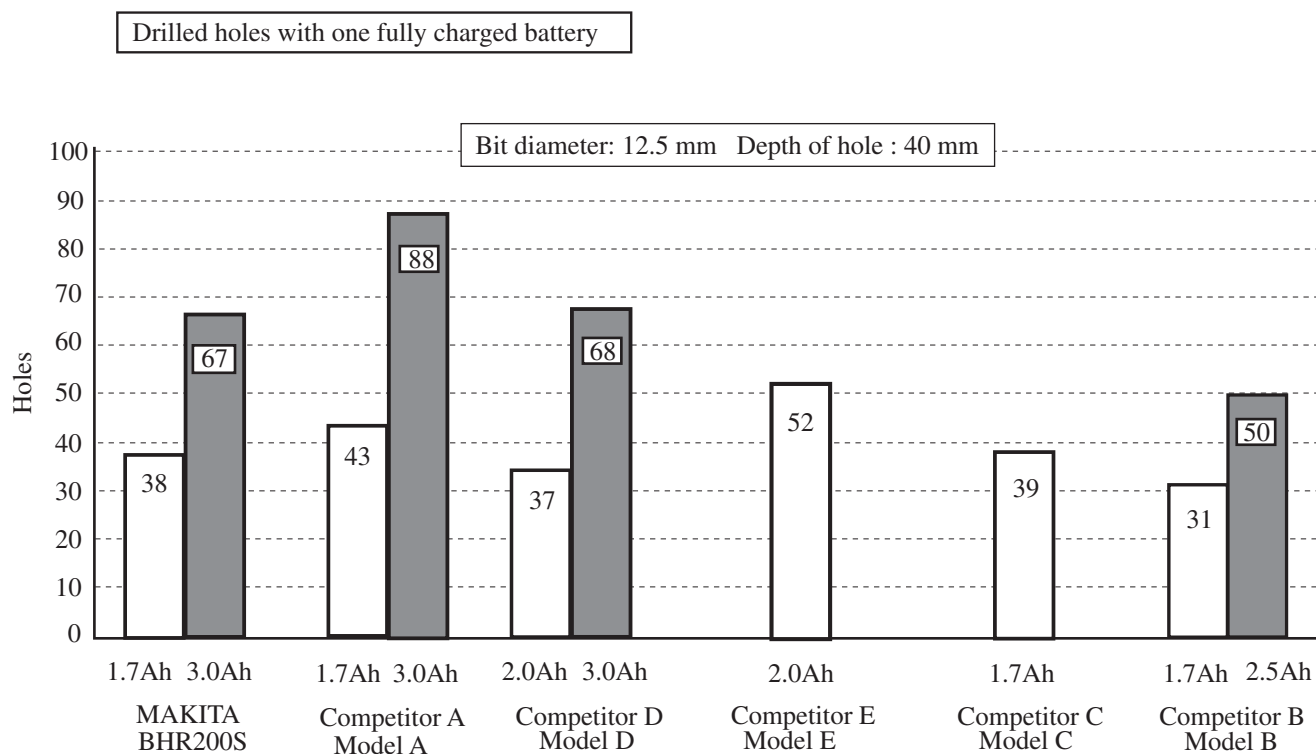
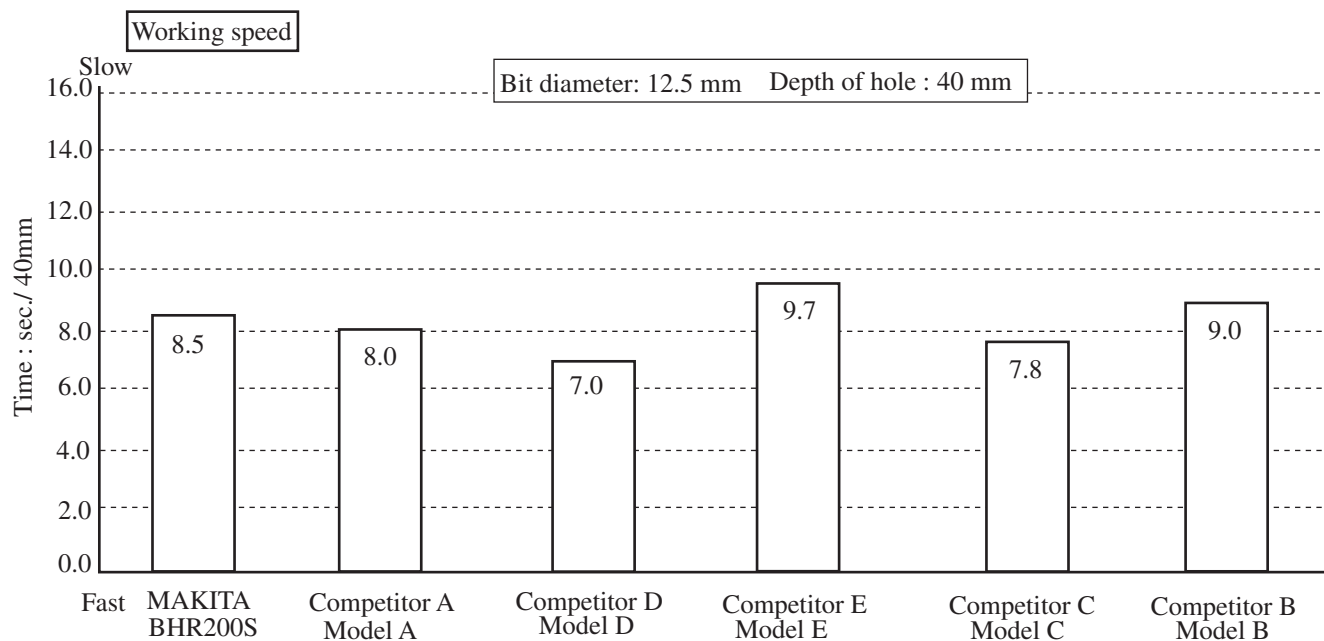
Working speed

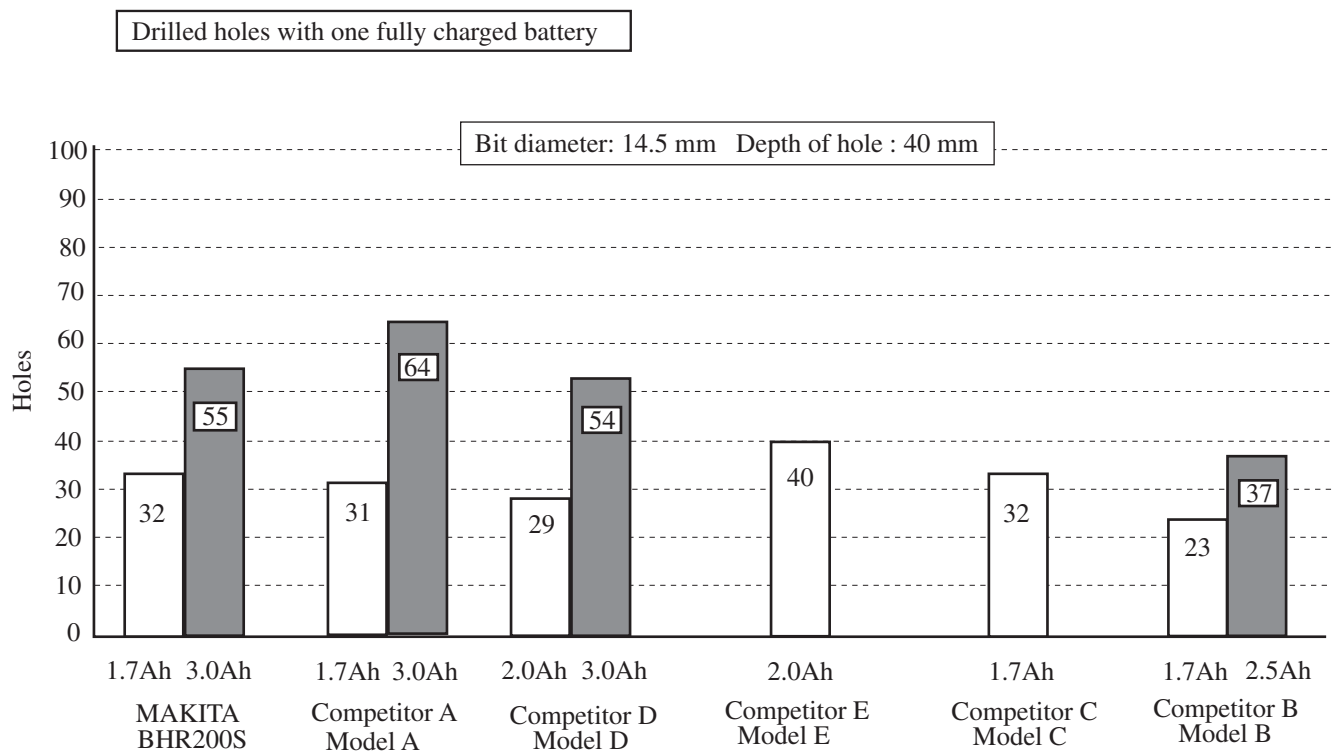
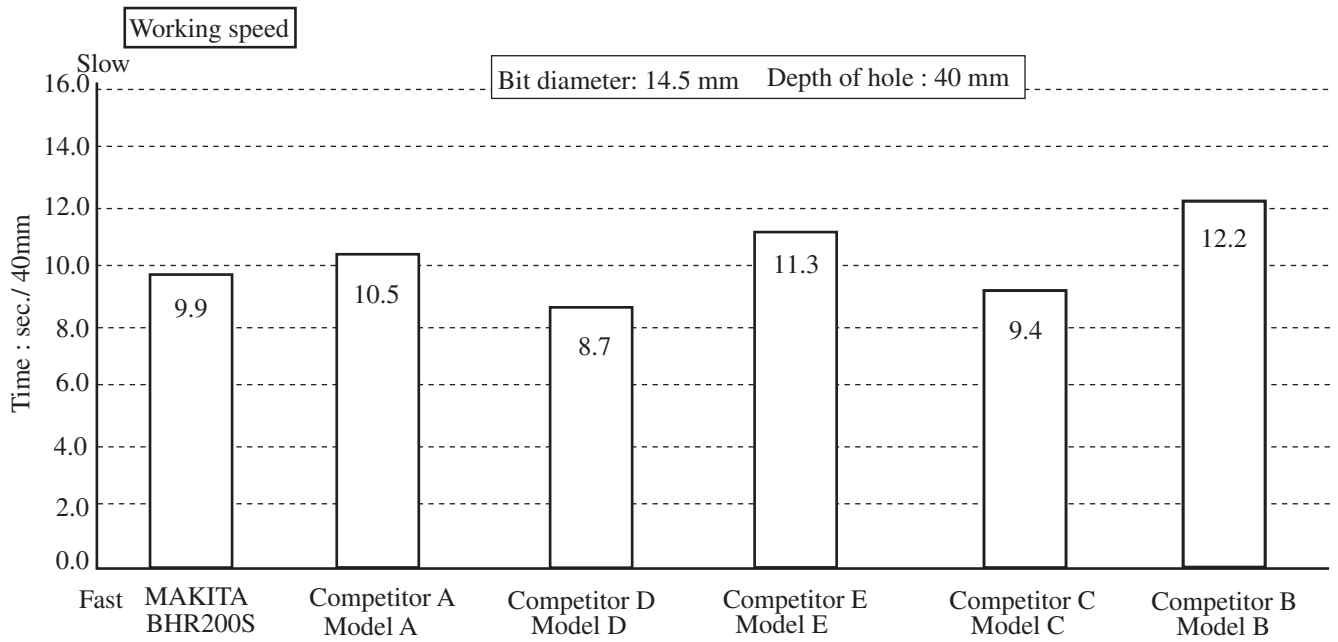


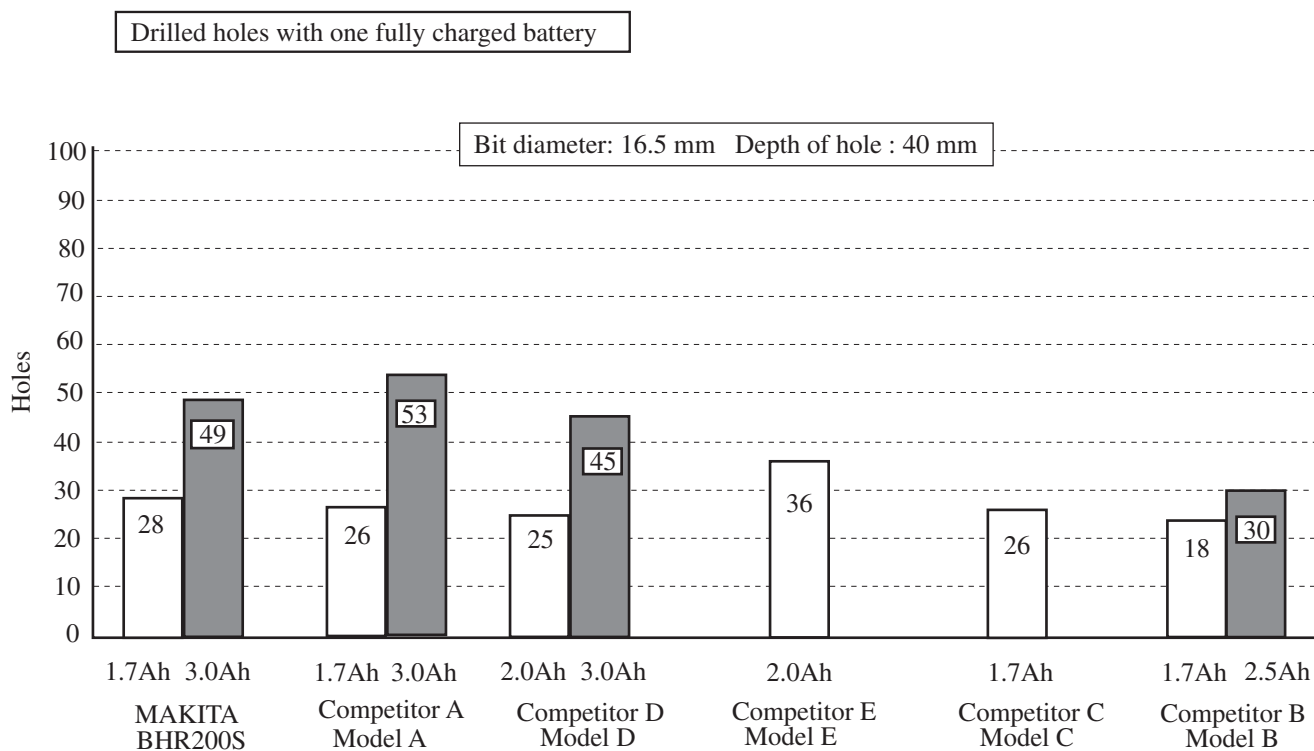
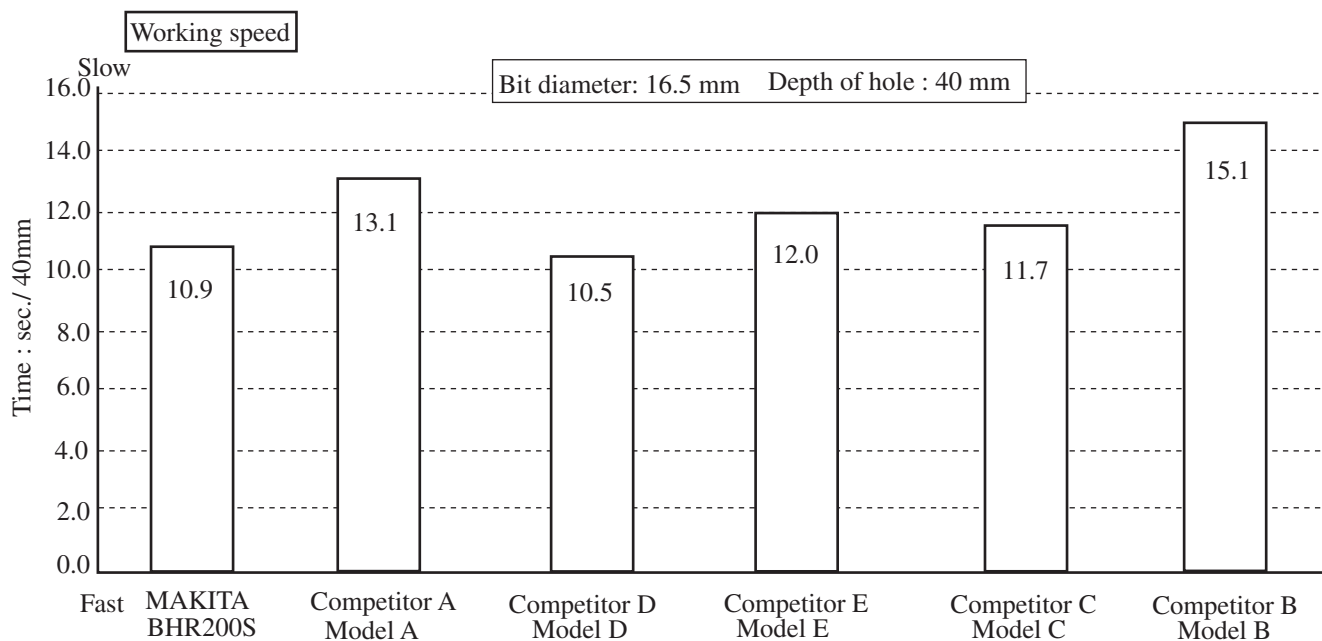
Drilled holes with one fully charged battery

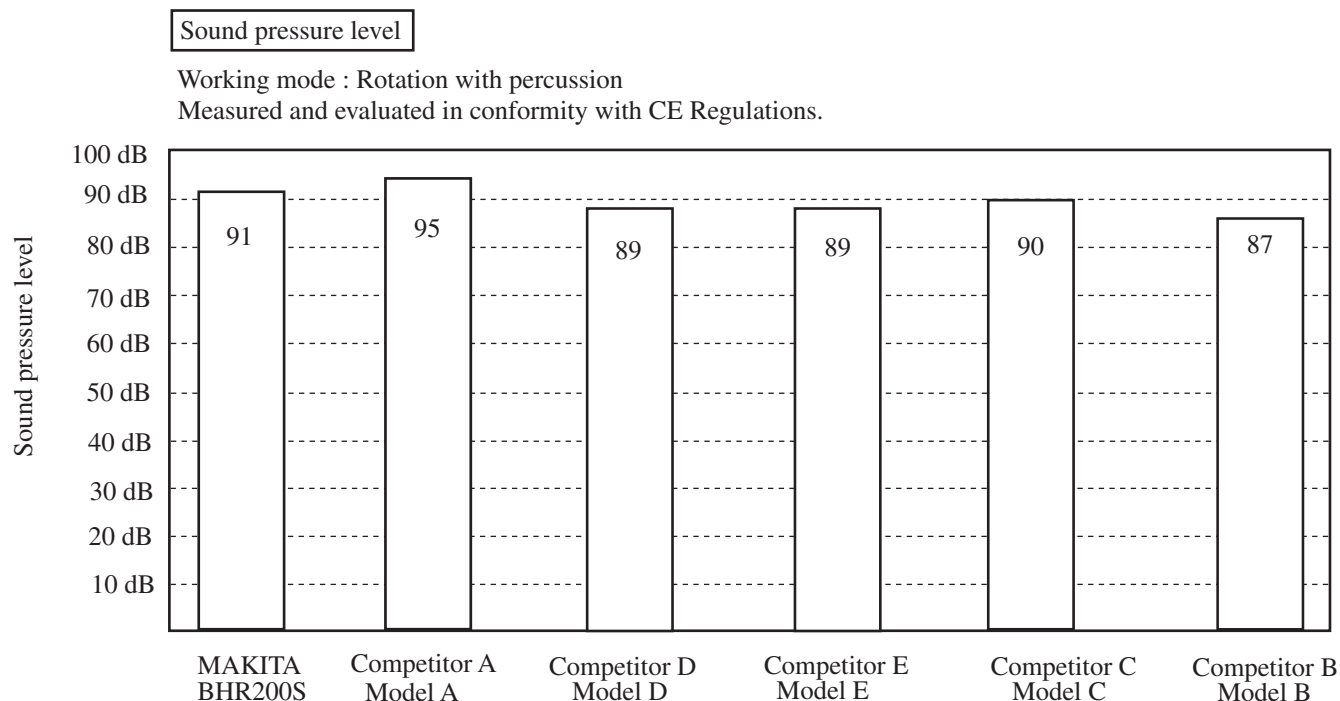
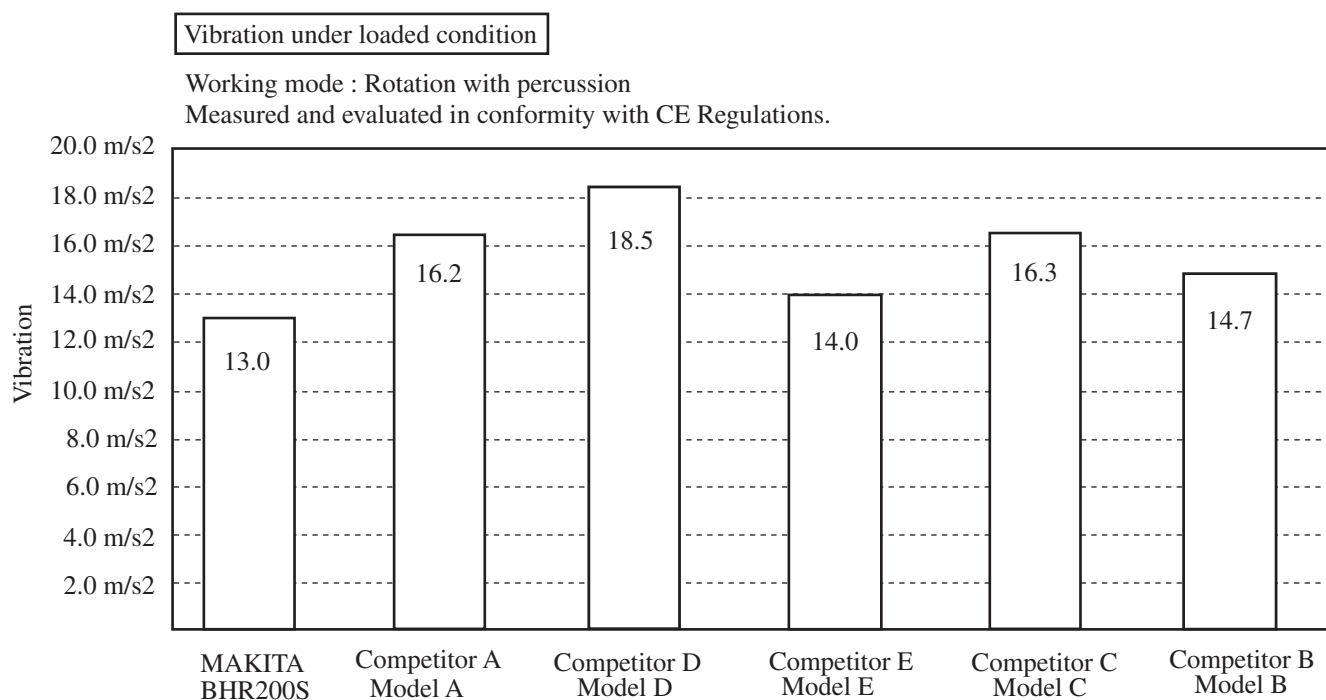
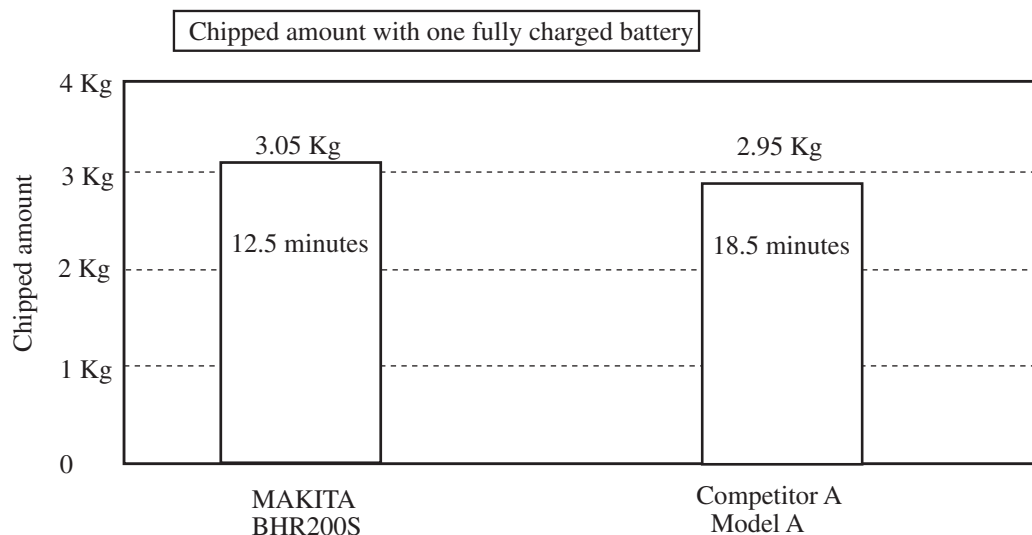










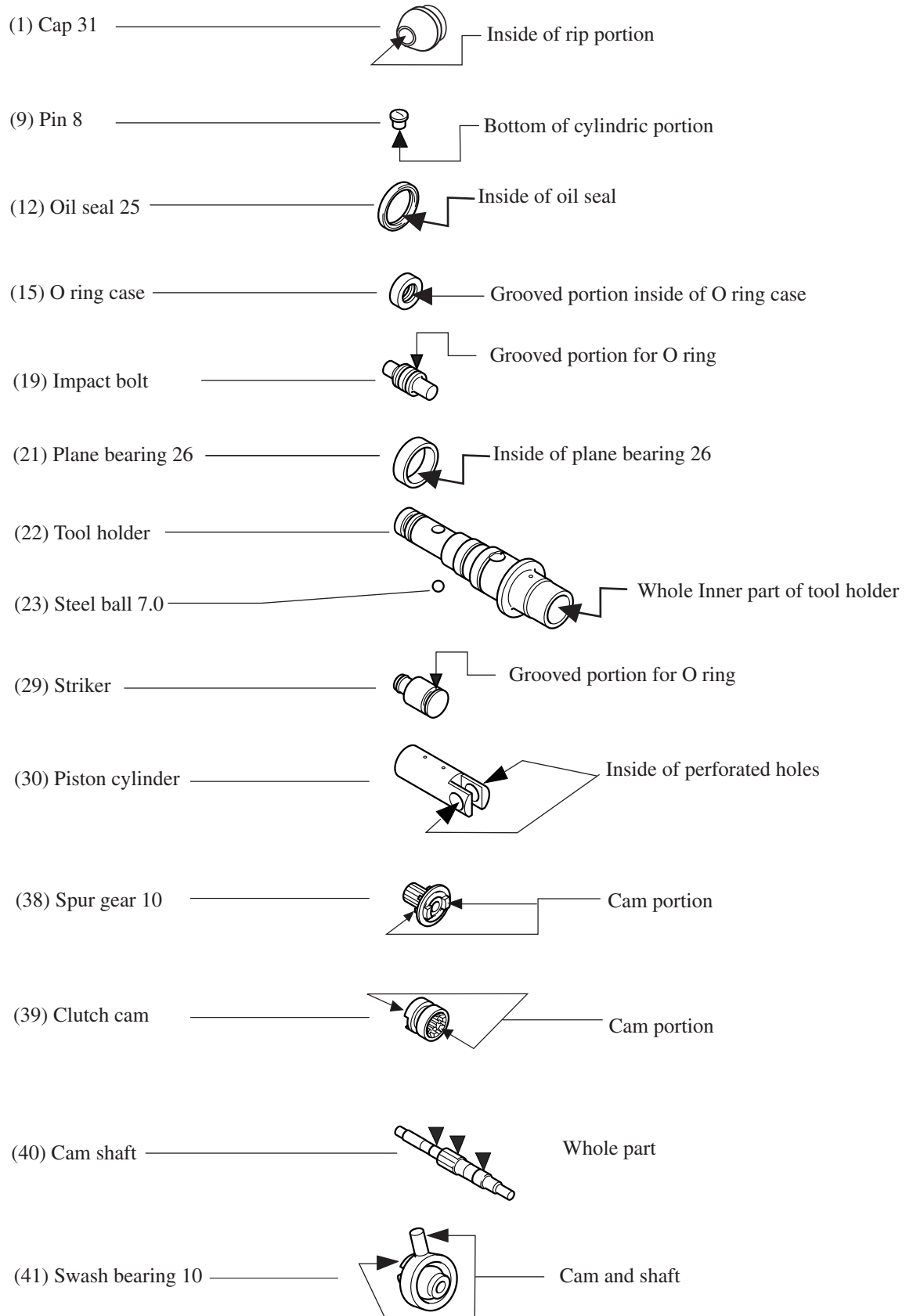


Lubrication

Put grease on the following places in order to protect parts and machine from unusual abrasion and overheating. Recommendable is our genuine grease, "MAKITA Grease R No.1".

All of O rings built in BHR200S

Teeth of all gears built in BHR200S



Removing

< 1 > Removing chuck section

- (1) Pull down chuck cover and detach cap 31 as illustrated in Fig. 1, and then, remove chuck cover and compression spring 38 as illustrated in Fig. 1A.

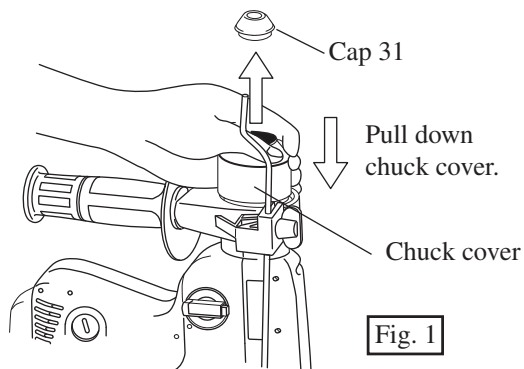


Fig. 1

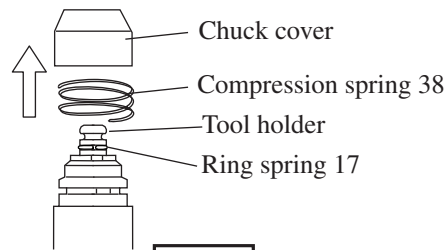


Fig. 1A

- (2) Lever up ring spring 17 with screwdriver, expanding it with 1R004 "retaining ring plier" and remove ring spring 17 from tool holder as illustrated in Fig. 2.

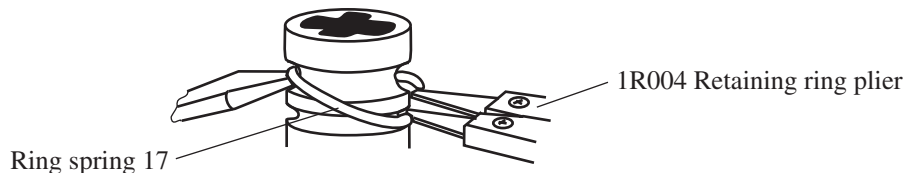


Fig. 2.

- (3) Remove ring spring 30.5 from chuck ring, and then, detach spring guide and compression spring 35 as illustrated in Fig. 3.

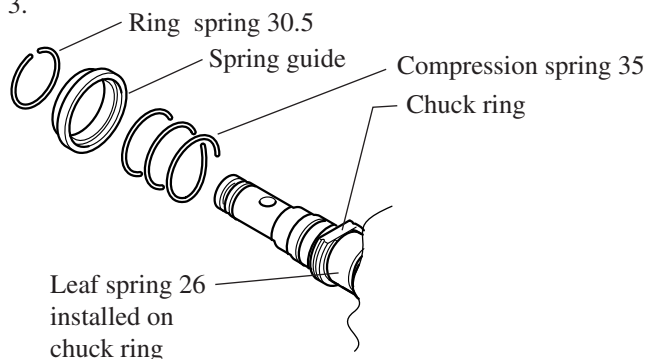


Fig. 3.

- (4) Remove leaf spring 26 with 1R003 "retaining ring plier" from chuck ring, and then, detach pin 8 as illustrated in Fig. 4. Remove chuck ring, steel ball 7.0 and guide washer from tool holder as illustrated in Fig. 4A.

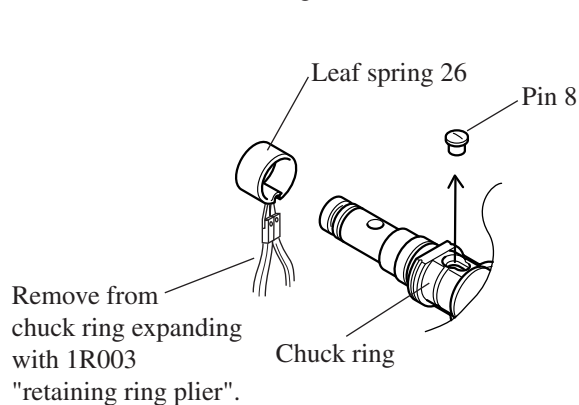


Fig. 4

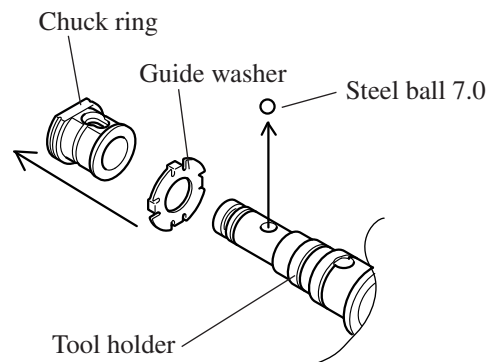
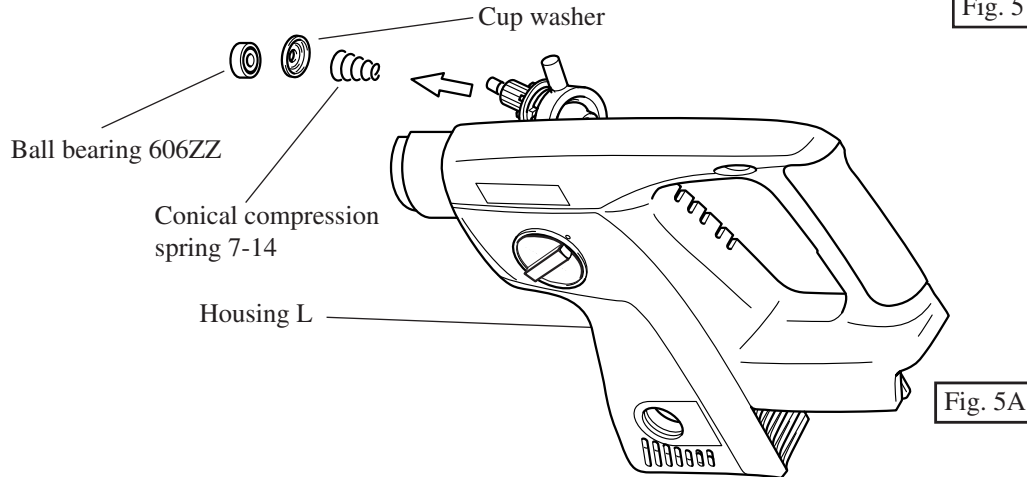
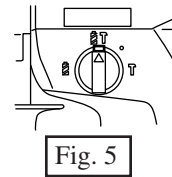


Fig. 4A

< 2 > Disassembling housing.

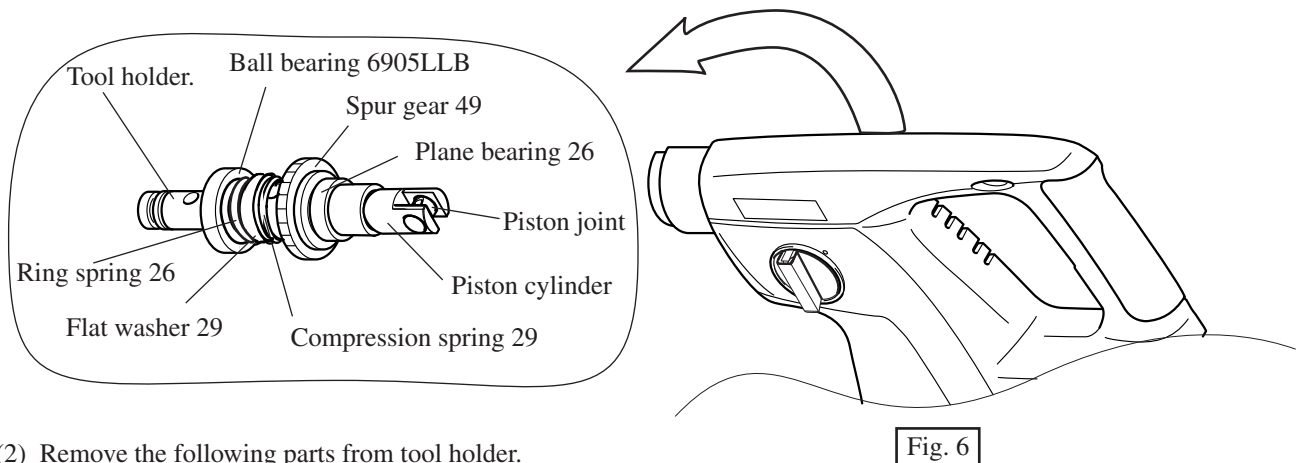
- (1) Pull down chuck cover and detach cap 31 as illustrated in Fig. 1.
- (2) Set change lever to the "rotation with percussion" mode as illustrated in Fig. 5. Otherwise, cam shaft is lifted up and ball bearing 606ZZ, cup washer and conical compression spring 7-14 easily come out from housing L. See Fig. 5A.



- (3) Remove foot by unscrewing 2 pcs. of tapping screws 4x18, if it is attached.
- (4) Dismount housing R from housing L by unscrewing 14 pcs. of tapping screws 4x18.

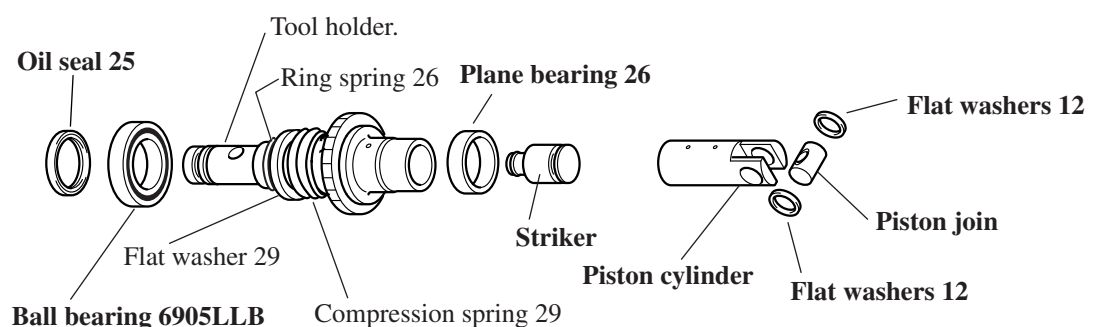
< 3 > Disassembling clutch section.

- (1) Disassemble the chuck section as per < 1 > and < 2 >, and take out tool holder unit from housing. See Fig. 6.



- (2) Remove the following parts from tool holder.
 - * Oil seal 25 * Ball bearing 6905LLB * Plane bearing 26
 - * Piston joint * 2 pcs. of flat washers 12 * Piston cylinder
 - * Striker

Ball bearing 6905LLB can be easily removed by using 1R045 "Large gear extractor".



- (3) Expand ring spring 26 with 1R045 "retaining ring plier", So the ring spring 26 is to be pushed out from the groove of tool holder by compression spring 29. And then, it can be removed with screwdriver.

< Note > Remove ring spring 26 putting tool holder unit on the working table as illustrated in Fig.8. Otherwise, the parts on the tool holder are ejected together with compression spring 29.

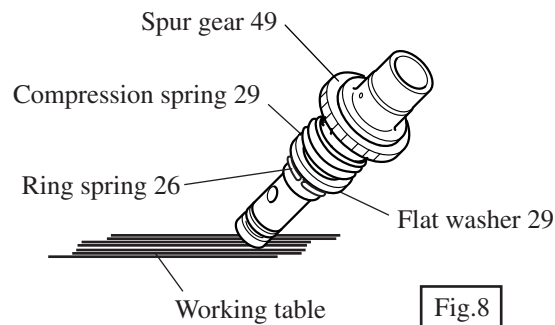


Fig.8

- (4) Remove spur gear 49 from the tool holder.

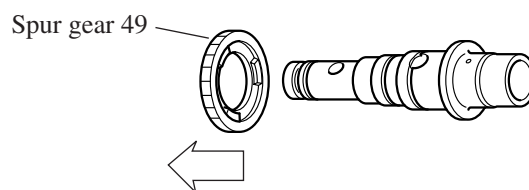


Fig. 9

< 4 > Disassembling impact bolt

- (1) Disassemble the chuck section as per < 1 >, < 2 > and < 3 >, and take out tool holder unit from housing. See Fig. 6.
- (2) If the cut section of ring spring 21 is located in the holes of tool holder as illustrated in Fig. 10, set the ring spring 21 as illustrated in Fig. 10A by sliding its cut section with slotted head screwdriver.

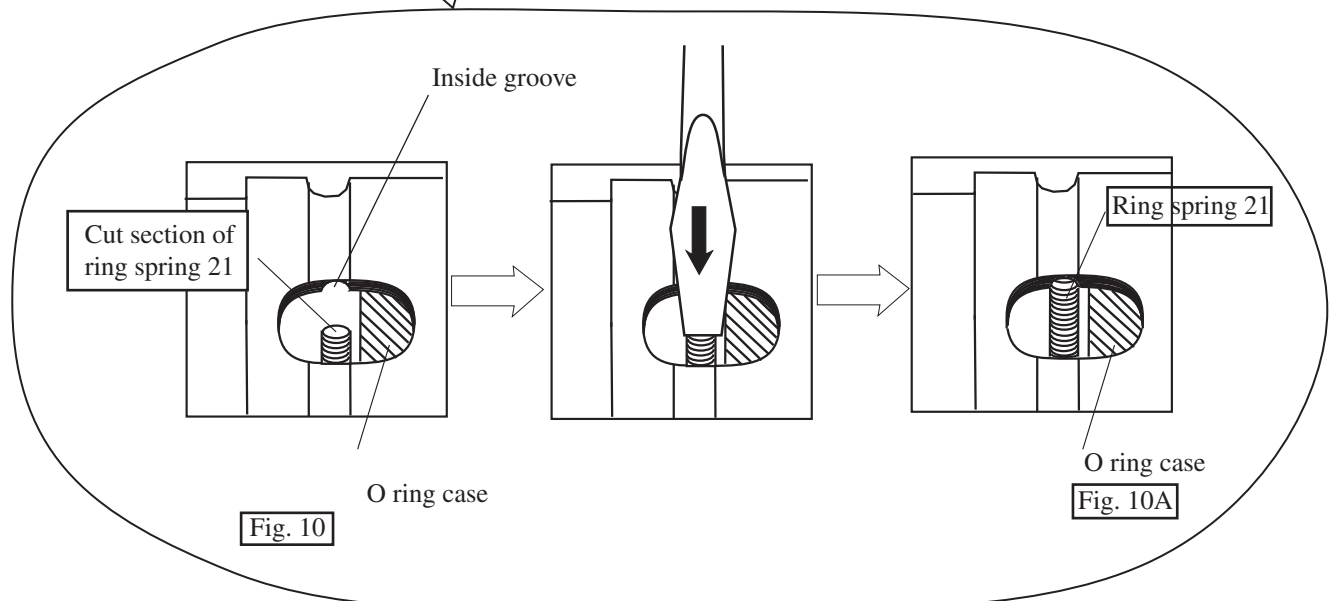
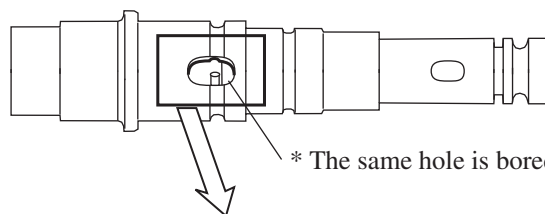
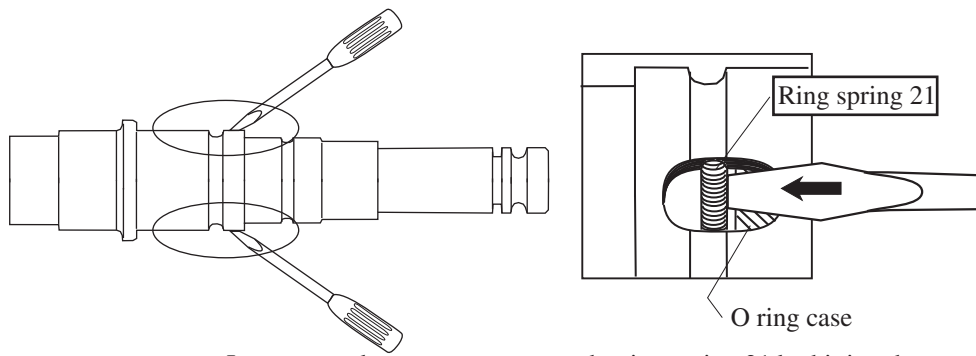


Fig. 10

Fig. 10A

- (3) Insert a slotted head screwdriver between ring spring 21 and O ring case as illustrated in Fig. 11.
And push out the ring spring 21 from the inside groove of tool holder, with the slotted head screwdriver



In case may be, you can remove the ring spring 21 by hitting the screwdriver.

Fig. 11

- (4) Insert 1R236 "round bar for arbor 7mm" in tool holder and remove the following parts from tool holder by pressing with arbor press. See Fig. 12. After removing, clean the inside of tool holder in order to prevent O ring's wearing away.

- * Ring spring 21
- * O ring case with O ring 11
- * O ring 12
- * Ring 12
- * Impact bolt

1R236
"Round bar for arbor 7mm"

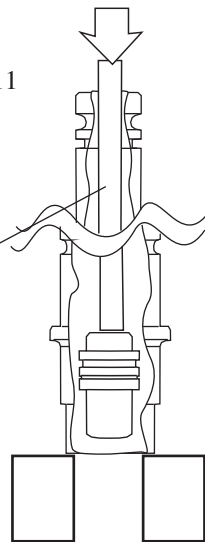


Fig. 12

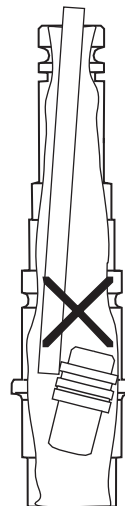


Fig. 12A

< Note >

Press "round bar for arbor 7mm" vertically.
Otherwise, impact bolt can not be removed,
because "the round bar for arbor" may sticks
into the space between the tool holder
and impact bolt as illustrated in Fig. 12A.

< 5 > Removing swash bearing 10

- (1) Disassemble housing as per < 2 >, and then, take out the cam shaft unit from housing L.
(2) Remove ring 6 and ball bearing 626DDW with 1R269 "bearing extractor" as illustrated in Fig. 13.

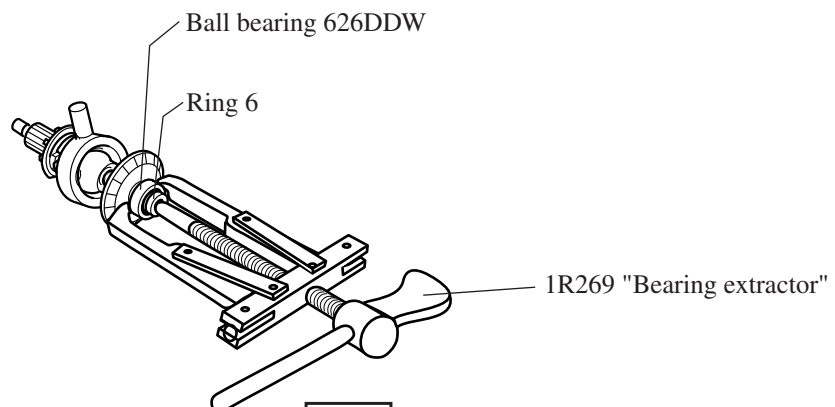


Fig. 13

- (3) Hold zerol bevel gear 32 with 1R022 "bearing extractor plate" as illustrated in Fig. 14.
And press cam shaft with arbor press. Swash bearing can be removed from cam shaft.

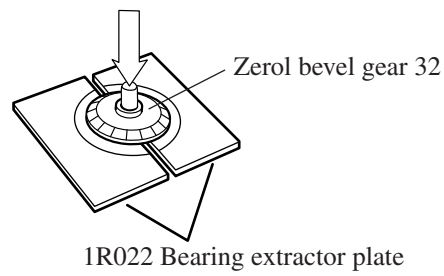


Fig. 14

< 6 > Removing change lever

- (1) Disassemble housing as per < 2 >, and then, take out the cam shaft unit and tool holder unit from housing L.
- (2) Set change lever to percussion mode as illustrated in Fig. 15.

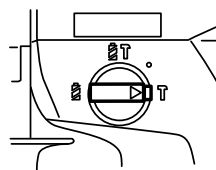


Fig. 15

< Note > It is impossible to remove change plate in the other mode.

- (3) Remove change plate and compression spring 4, And detach guide plate by unscrewing 2 pcs. of tapping screws 4 x 12 as illustrated in Fig. 16.

- (4) Detach retaining ring S-18, And pull out change lever with pressing lock button as illustrated in Fig. 16.

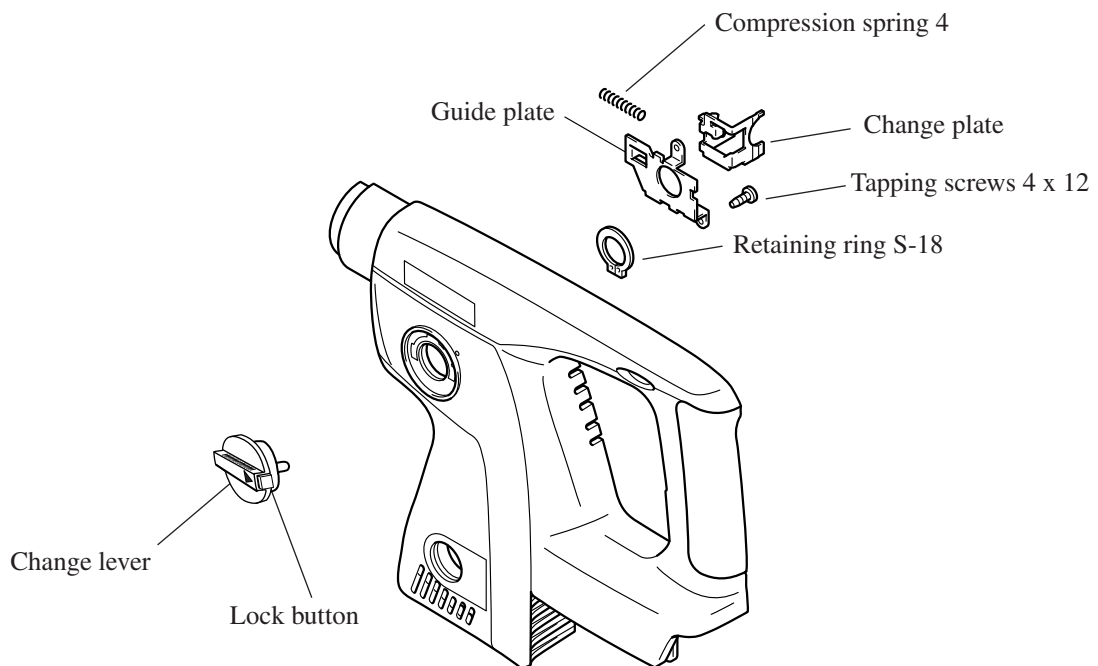
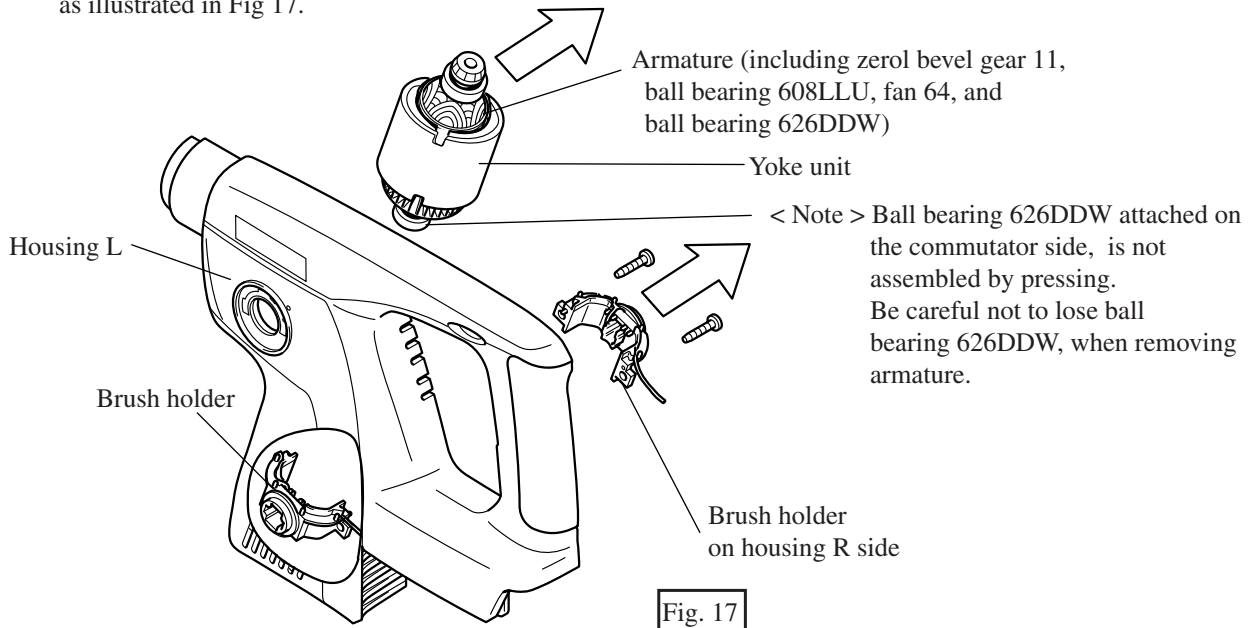


Fig. 16

< 7 > Removing armature

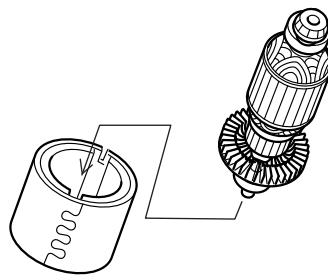
- (1) Disassemble housing as per < 2 >, and then, take out brush holder on housing R side, by unscrewing 2 pcs. of tapping screws 4 x 18 as illustrated in Fig. 17. (No need to remove brush holder assembled in housing L.)
- (2) Remove armature together with yoke unit as illustrated in Fig 17.



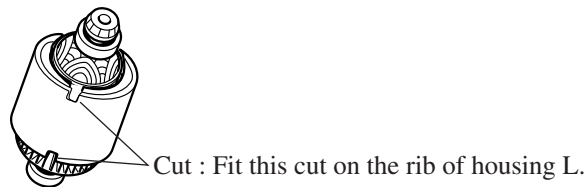
Assembling

< 8 > Assembling armature

- (1) Insert armature into yoke unit as illustrated in Fig 18.
< Note > Armature is dragged into yoke unit easily, with its very strong magnetic force.
Be careful not to damage the armature wire, zerol bevel gear 11 and commutator in this process.



- (2) Assemble yoke unit and armature to housing L



- (3) Attach brush holders to housing L, and fasten them with 2 pcs. of tapping screw 4 x 12.

< 9 > Assembling equipment for mode change

(1) Attach compression spring 4, lock button and O ring 17 to change lever as illustrated in Fig.20.

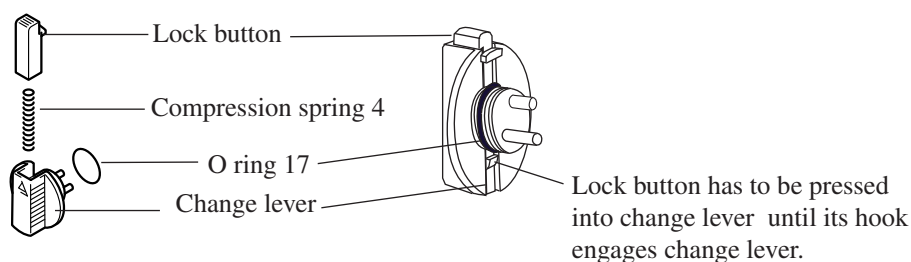


Fig.20

(2) Attach the above change lever to housing L. And assemble retaining ring S-18 as illustrated in Fig.21. Set the change lever to percussion mode as illustrated in Fig. 21A. Assemble guide plate to housing L with 2 pcs. of tapping screws 4 x 12.

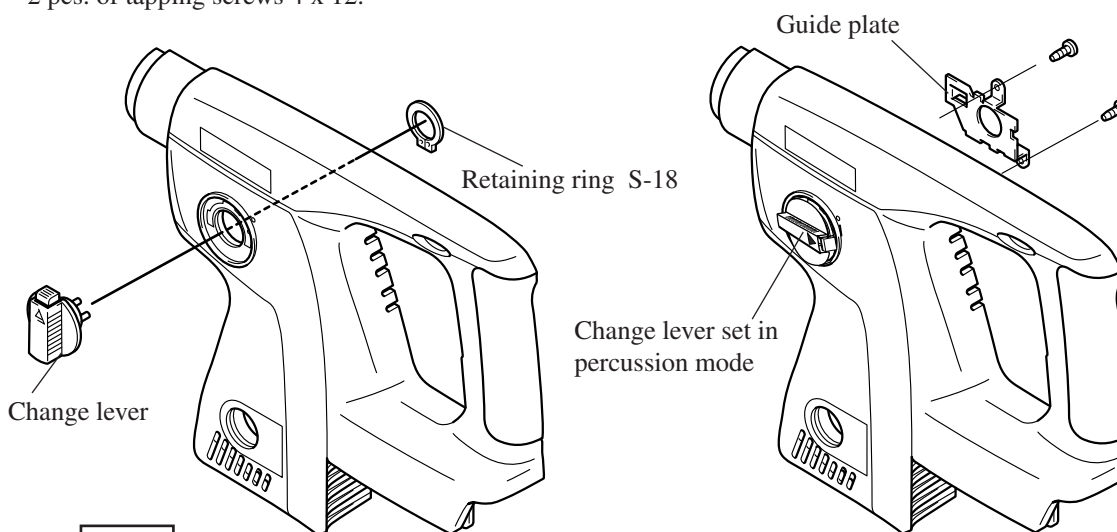
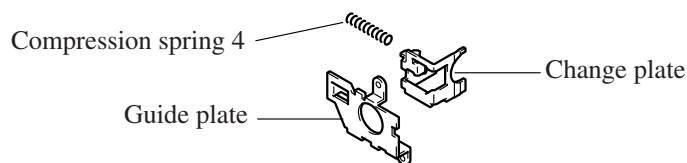


Fig.21

Fig.21A

(3) Assemble change plate as follows.

1. Set compression spring 4 to change plate as illustrated in Fig.22A.
2. Set compression spring 4 assembled on change plate, to guide plate as illustrated in Fig. 22B
3. Mount the whole change plate on guide plate, setting the under edge of the change plate to the rib of guide plate as illustrated in Fig 22C.
4. Set change lever on the rotary hammer mode to prevent that the change plate slips off from the guide plate's rib.



Top view of the above parts

Side view of the above parts assembled to guide plate

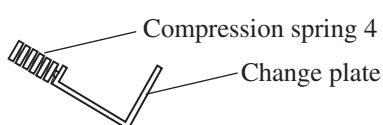


Fig.22A

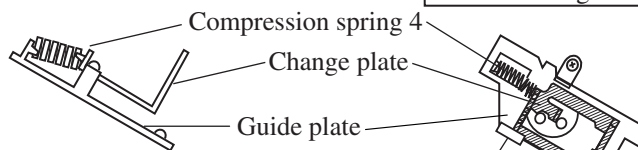


Fig. 22B

Fig 22C

Set the under edge of the change plate to the rib of guide plate.

< 10 > Assembling impact bolt

- (1) Assemble O ring 12 (thin type) to impact bolt, and insert the impact bolt deep into tool holder.

< Note > The impact bolt has to be inserted as illustrated in Fig. 23.

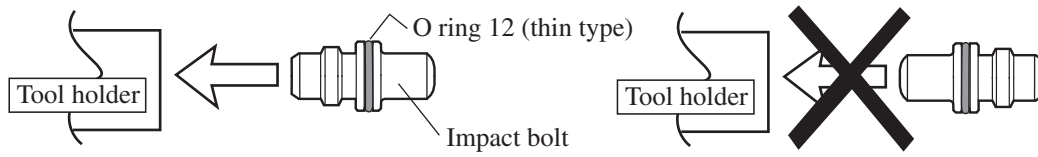


Fig. 23

- (2) Insert the parts into the tool holder in the following order as illustrated in Fig. 24.

1. Ring 12
2. O ring 12 (thick type)
3. O ring case in which O ring 11 has been inserted in advance.

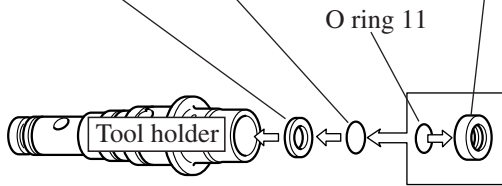


Fig. 24

- (3) Press ring spring 21 into the tool holder with 1R248 "Round bar for arbor 22mm" until it fits in the groove which is grooved inside of tool holder. See Fig. 25. And make sure that the ring spring 21 is fit in the groove.

1R248 "Round bar for arbor 22mm"
Ring spring 21

Press with arbor press.

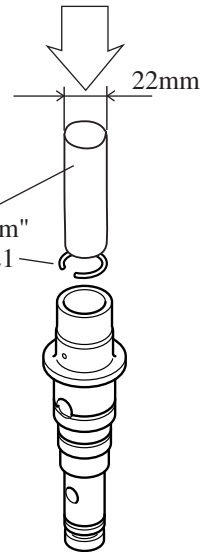


Fig. 25

< 11 > Assembling spur gear 49 and other parts to tool holder

- (1) Set 1R272 "Ring Spring Setting Tool A" on the tool holder which is assembled as mentioned in < 10 >. And then set spur gear 49, compression spring 29 and flat washer 29 as illustrated in Fig. 26.

- (2) Set ring spring 26 on the 1R272 "Ring Spring Setting Tool A" as illustrated in Fig. 26.

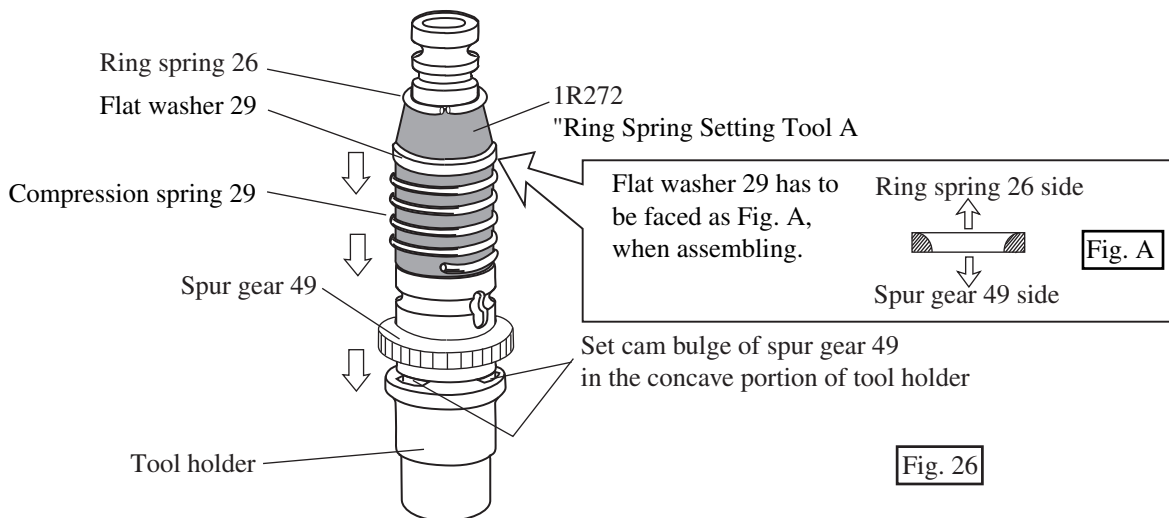
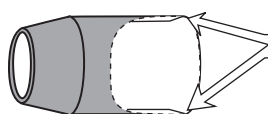


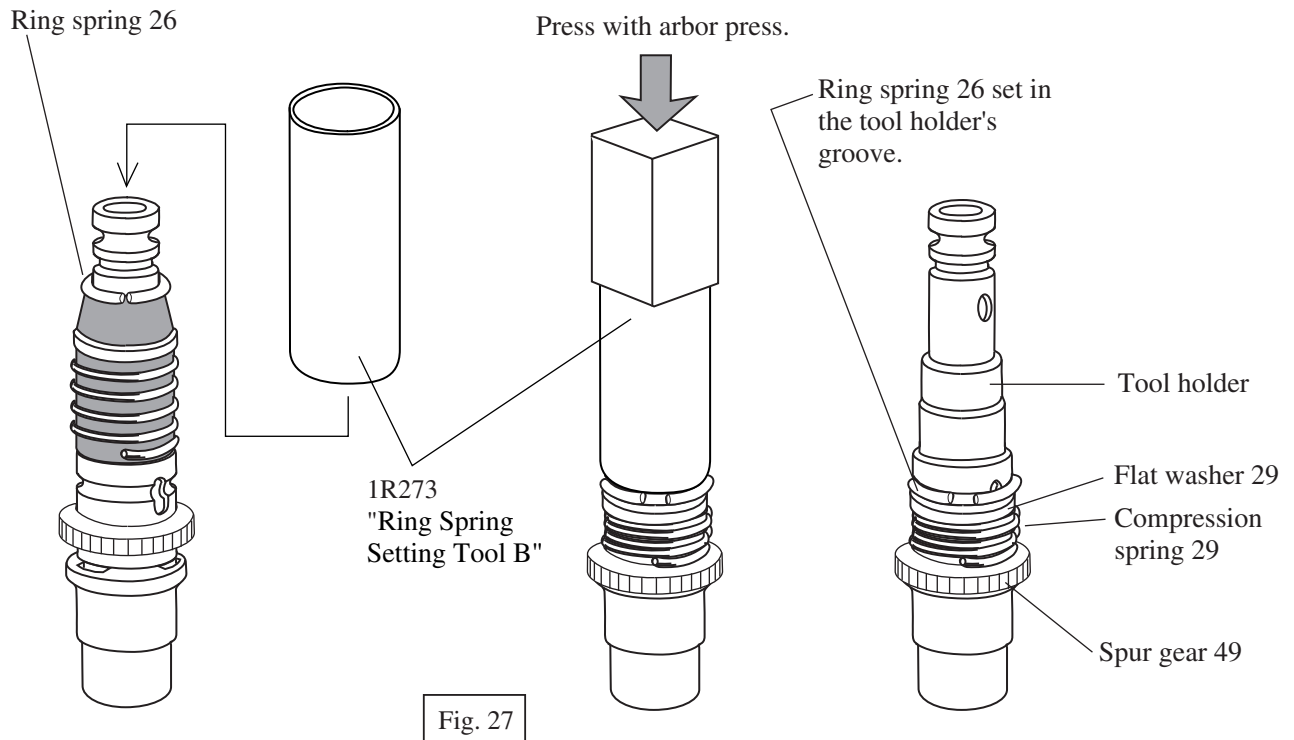
Fig. 26



1R272
Ring Spring Setting Tool A

< Note > Be careful, not to hurt yourself with this edge, because it is sharpened.

- (3) Put 1R273 "Ring Spring Setting Tool B" on the top of tool holder. Press it with arbor press as illustrated in Fig. 27 to set ring spring 26 in the groove of tool holder.

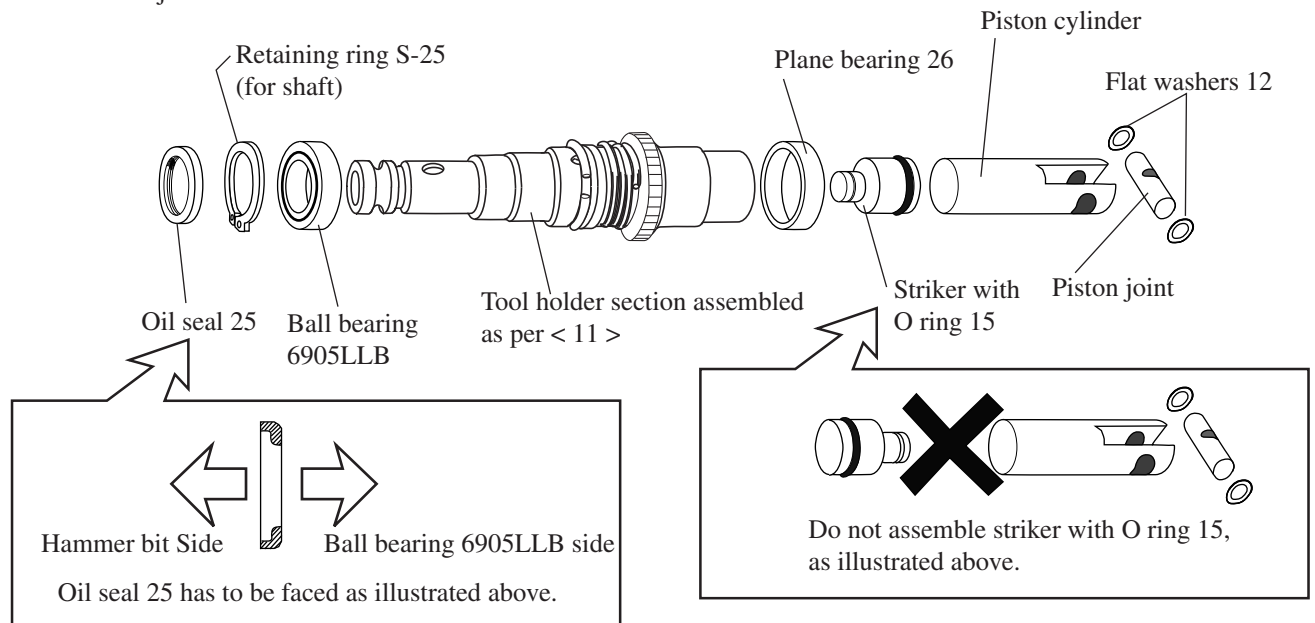


- (4) Make sure that ring spring 26 is set in the groove of tool holder completely.

< 12 > Assembling tool holder section

- (1) Assemble the following parts to the tool holder assembled as per < 11 >. See Fig. 28.

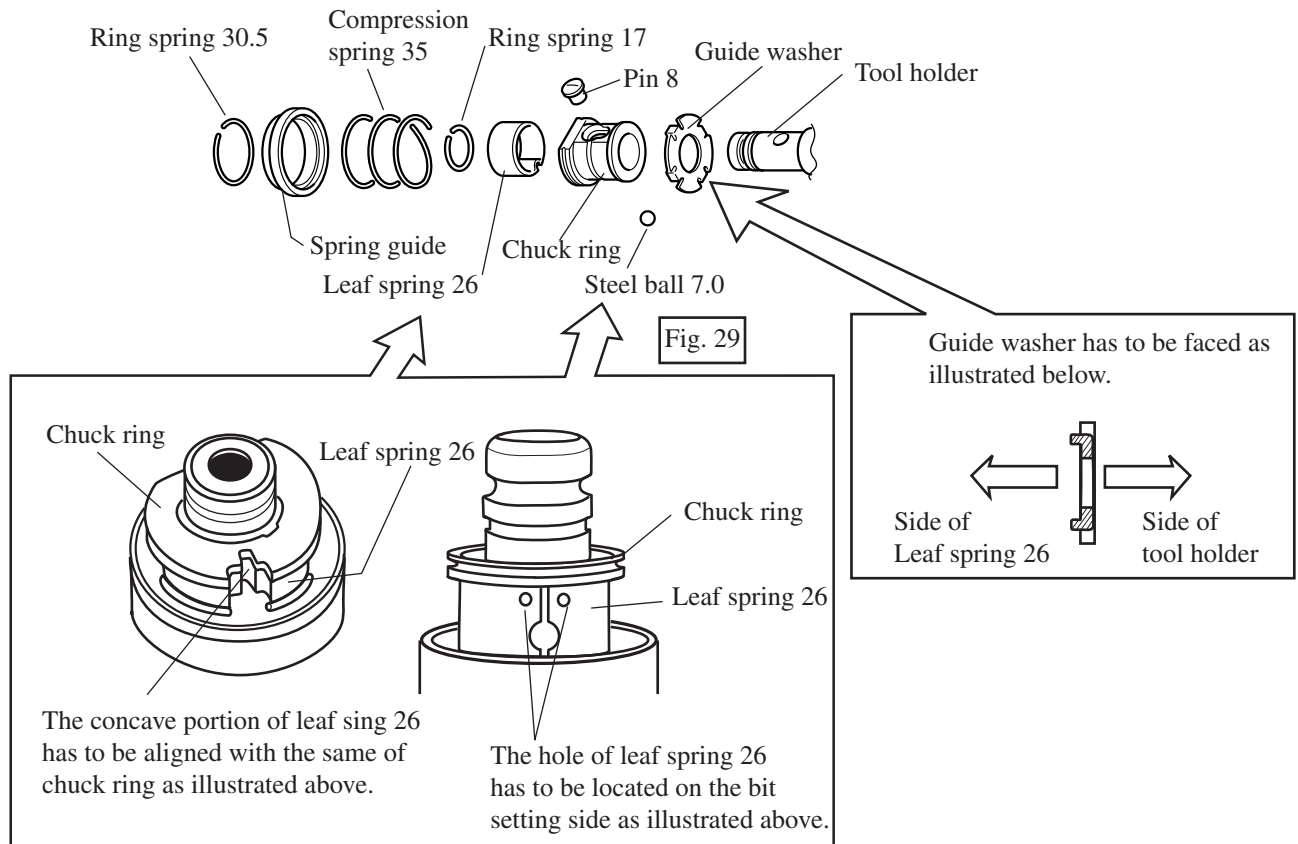
- * Ball bearing 6905LLB
- * Retaining ring S-25 (for shaft)
- * Oil seal 25
- * Plane bearing 26
- * Striker with O ring 15
- * Piston cylinder
- * 2 pcs. of Flat washers 12
- * Piston joint



< 13 > Assembling chuck section

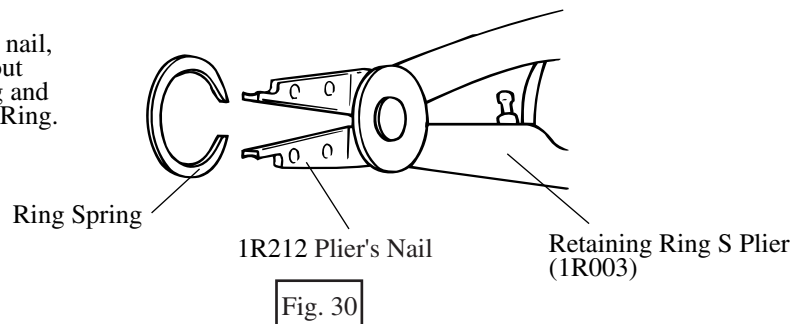
(1) Assemble the following parts to the tool holder as illustrated in Fig. 29.

- | | | | | |
|----------------|------------------|------------------|-------------------------|--------------------|
| * Guide washer | * Steel ball 7.0 | * Leaf spring 26 | * Compression spring 35 | * Ring spring 30.5 |
| * Chuck ring | * Pin 8 | * Ring spring 17 | * Spring guide | |



(2) It is recommended to use 1R212 "Plier's Nail" for easy mounting of ring spring 17 and 26.

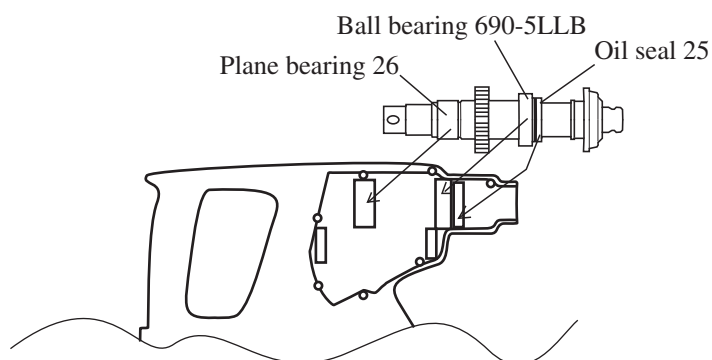
Owing to the concave nail, you can operate without sliding of Ring Spring and Concentric Retaining Ring.



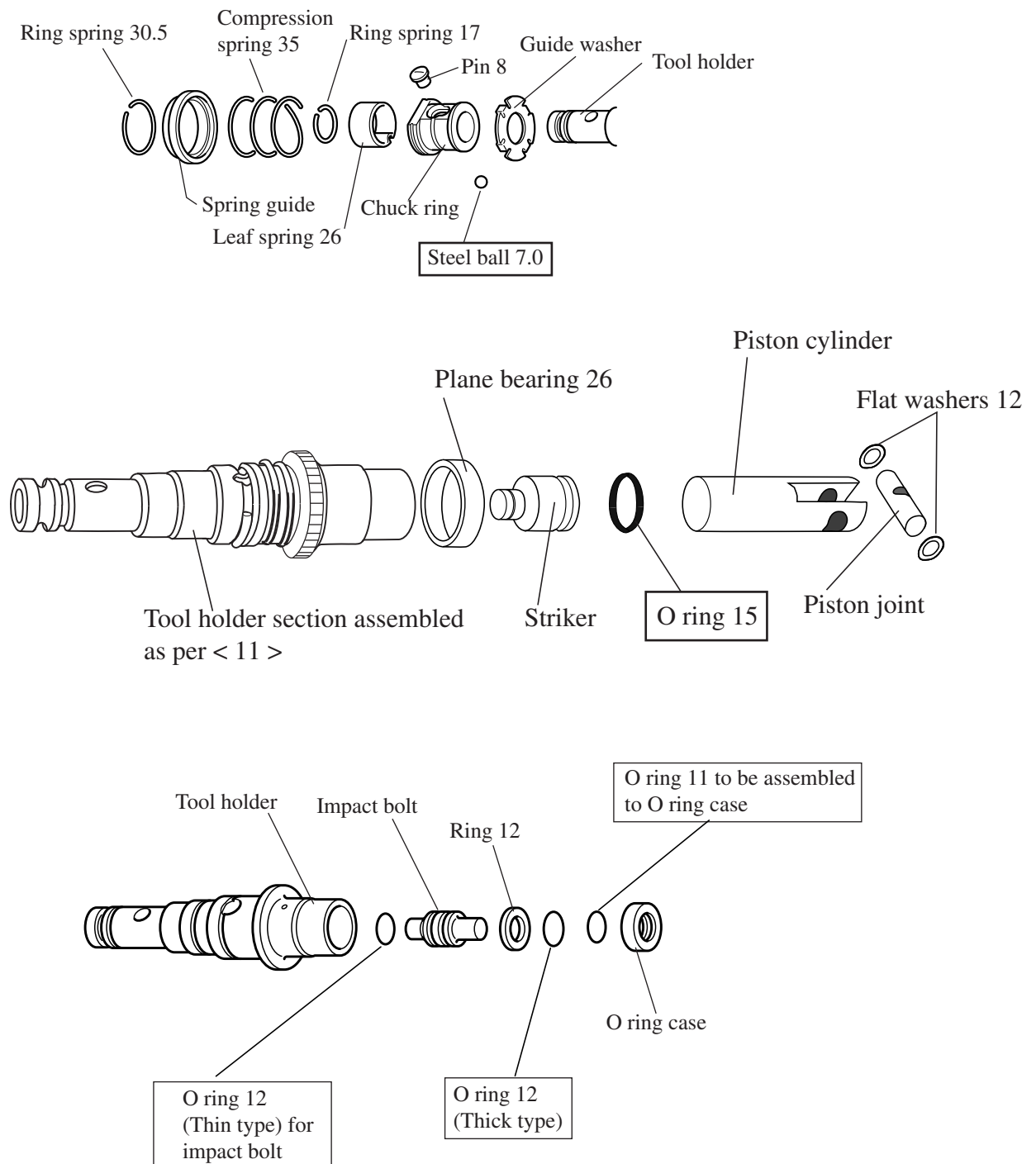
< Note > Be careful not to expand ring spring 17 too wide in order to prevent its deformation.

< 14 > Assembling the tool holder section to housing.

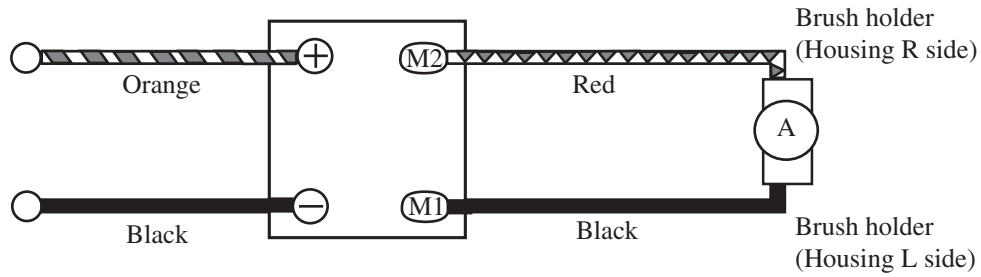
(1) Assemble the tool holder section by setting oil seal 25, ball bearing 6905LLB and plane bearing 26 in the concave portion for them as illustrated in Fig. 31.



< 15 > It is recommended to replace the following parts in the square, when replacing carbon brush.



► **Circuit diagram**



► **Wiring diagram**

