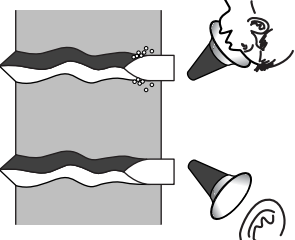


# New Edison-style Cup Phonograph Kit

Why can we record and replay voices?

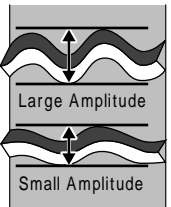


**Recording**

Your voice vibrates the air minutely when it gets into the horn. Then the vibration is conducted to the needle and is translated into a wavy movement of the needle and carves a groove on the cup.

**Replay**

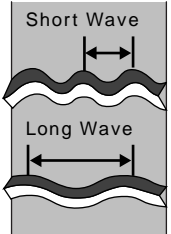
When replaying, the other way round, the waves of the groove vibrate the needle and the vibration is conducted to the horn and the sound is produced from the horn.



**Loud Sound**   **Soft Sound**

Large Amplitude

Small Amplitude



**High Sound**   **Low Sound**

Short Wave

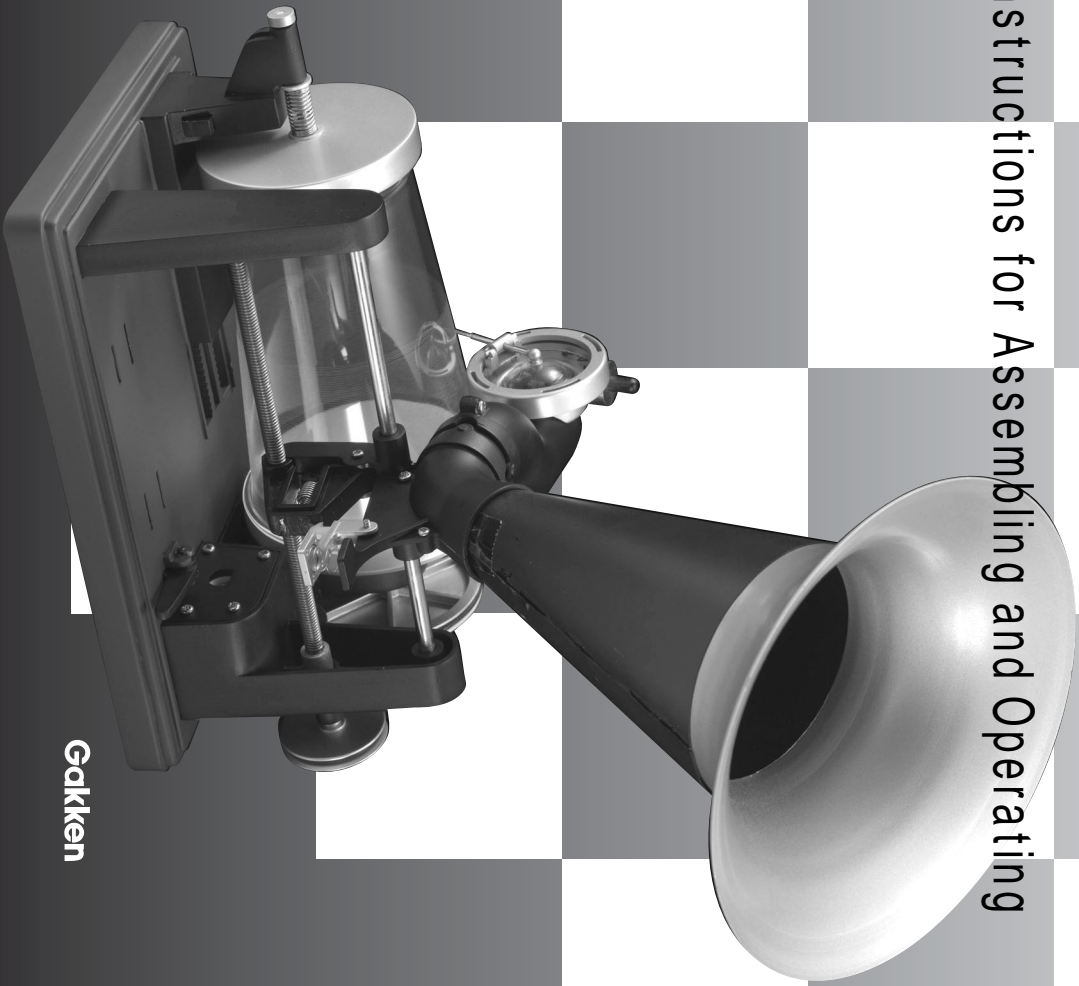
Long Wave

The difference in the tones reflects the difference in the shapes of the waves.

大人の科学® Otona no Kagaku  
The Sophisticated Science Kit for Adults

## New Edison-style Cup Phonograph Kit

Instructions for Assembling and Operating

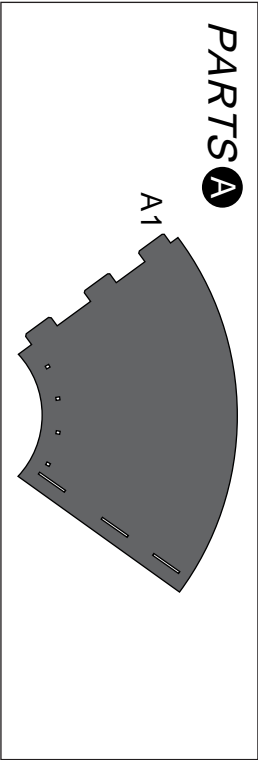


Gakken

# Parts List New Edison-style

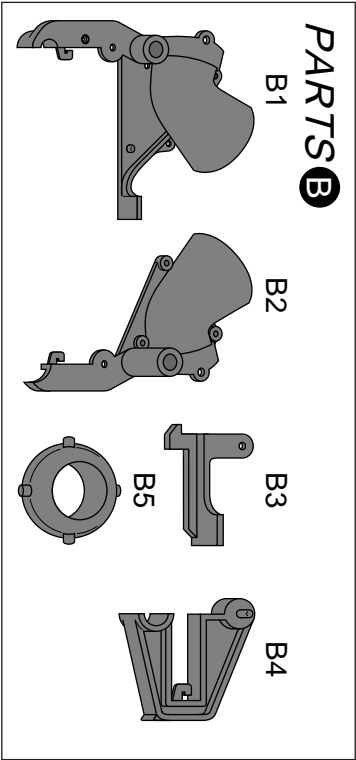
## PARTS A

A1 / cone



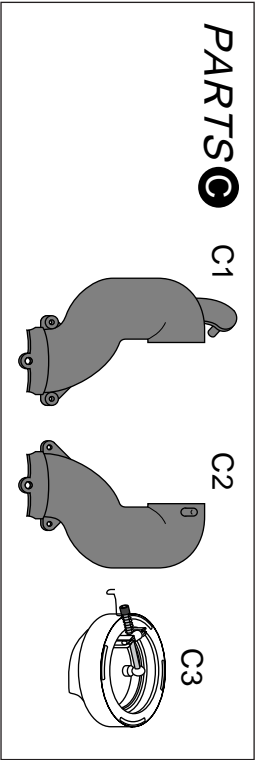
## PARTS B

- B1 / elbow
- B2 / elbow
- B3 / guide stopper
- B4 / guide part
- B5 / ball joint



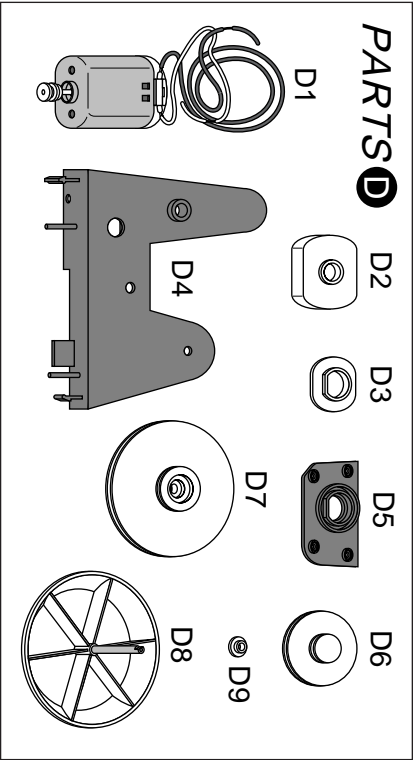
## PARTS C

- C1 / arm
- C2 / arm
- C3 / pickup



## PARTS D

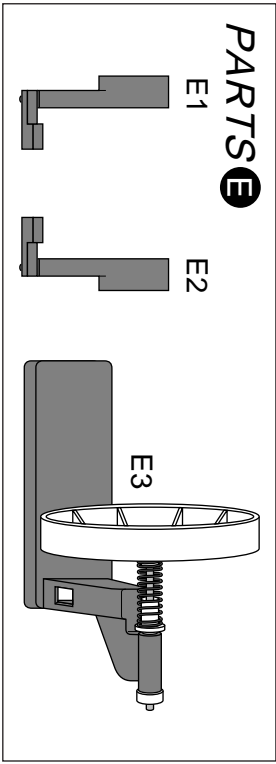
- D1 / motor
- D2 / rubber absorber
- D3 / rubber absorber
- D4 / motor box
- D5 / cover
- D6 / pulley
- D7 / pulley
- D8 / cup holder
- D9 / bearing



# Cup Phonograph Kit

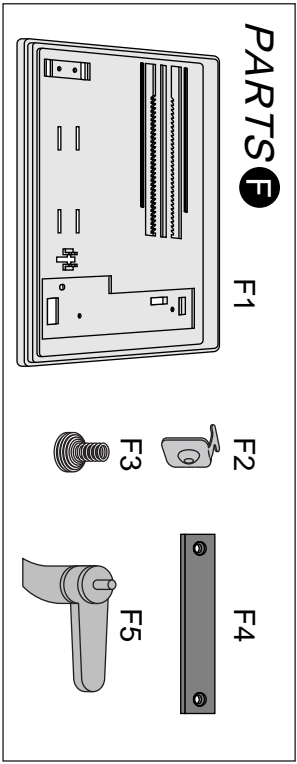
## PARTS E

- E1 / right slide stopper
- E2 / left slide stopper
- E3 / cup holder



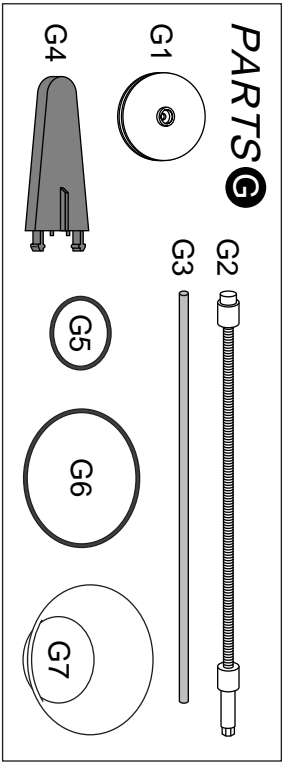
## PARTS F

- F1 / base panel
- F2 / positive terminal
- F3 / negative terminal with spring
- F4 / slide base
- F5 / switch

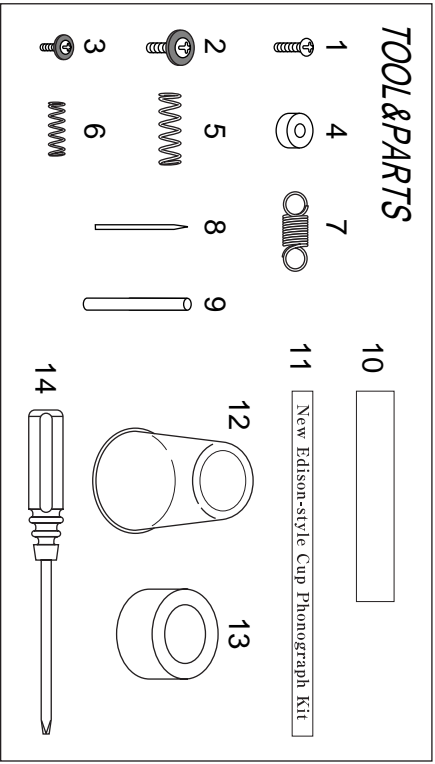


## PARTS G

- G1 / pulley
- G2 / screw shaft
- G3 / shaft
- G4 / shaft holder
- G5 / small belt
- G6 / large belt (2)
- G7 / tunnel



## TOOL&PARTS



## PARTS E

- E1 / right slide stopper
- E2 / left slide stopper
- E3 / cup holder

## PARTS F

- F1 / base panel
- F2 / positive terminal
- F3 / negative terminal with spring
- F4 / slide base
- F5 / switch

## PARTS G

- G1 / pulley
- G2 / screw shaft
- G3 / shaft
- G4 / shaft holder
- G5 / small belt
- G6 / large belt (2)
- G7 / tunnel

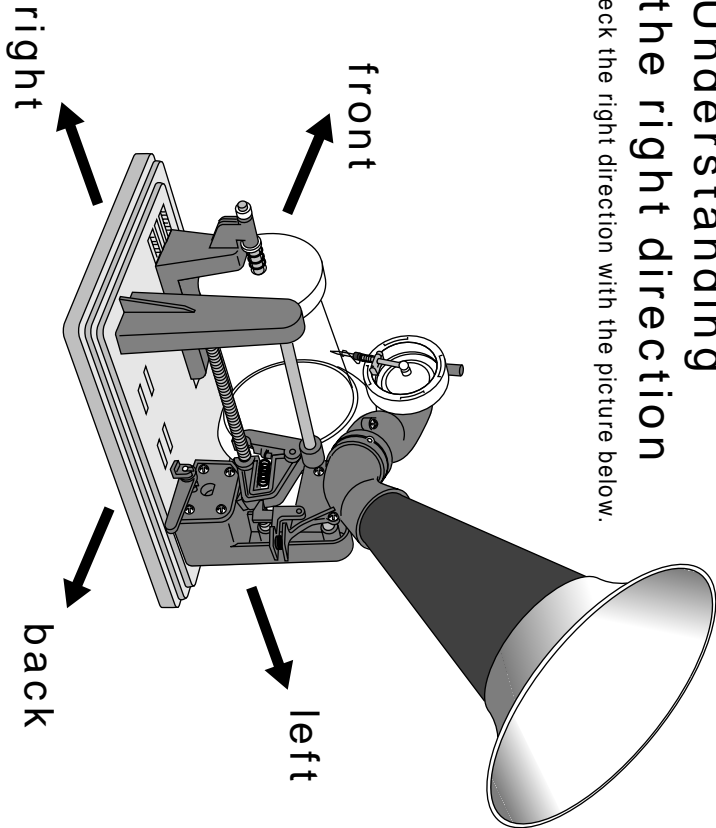
## TOOL&PARTS

- 1 / screw (6mm)
- 2 / large screw with collar
- 3 / small screw with collar
- 4 / weight (3)
- 5 / large spring
- 6 / small spring
- 7 / spring
- 8 / needle
- 9 / sewing needle adapter
- 10 / both side adhesive tape
- 11 / sticker
- 12 / cup
- 13 / styrene foam
- 14 / screwdriver (cross-headed tip)

# Before Assembling the Kit

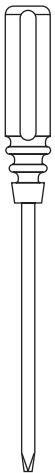
## 1. Understanding the right direction

Check the right direction with the picture below.



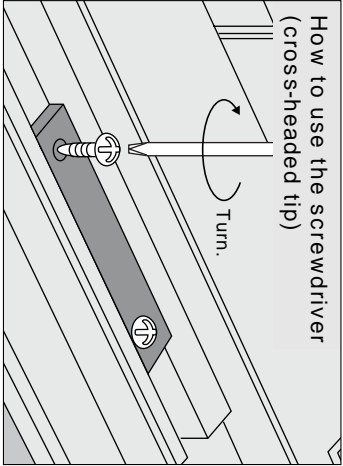
## 2. How to Use Supplied Tools

screwdriver  
(cross-headed tip)



The screwdriver can be used to tighten a screw.

The screws are self-tapping screws that create helix when driven in.



## 3. Things you will need

Two AA alkaline batteries , Scotch tape , scissors

Please note that shapes and length of materials may appear slightly different from pictures and illustrations in this booklet.

### ⚠ CAUTION Please read the following instructions before using this kit.

Use caution when handling a needle. Improper use may cause injury.

Use caution when handling some metallic parts that are made thin and sharp functionally. Improper use may cause injury.

To avoid the risk of suffocation, use caution not to swallow small parts.

Remove batteries after using the kit and keep away from babies and children.

Two size AA batteries are required. Improper use of the batteries may cause the generation of heat, explosions or leaks. The following precautions should be taken:

Do not use rechargeable batteries, such as nickel cadmium batteries.

Ensure that the positive and negative terminals on the batteries are facing the right way.

If liquid leaked from batteries gets in an eye, rinse it well in a lot of water immediately and consult a doctor. When liquid stick to skin or clothes, wash it up with water immediately.

Remove batteries after an experiment.

Please read the assembly instructions and cautions carefully before using the kit.

Instructions and cautions in this booklet should always be followed for safety. Do not use any materials that have become damaged or deformed while in use.

Keep this kit away from babies and children.

The plastic materials used in this kit

body (black)/ horn (gold): ABS bearing (white): POM

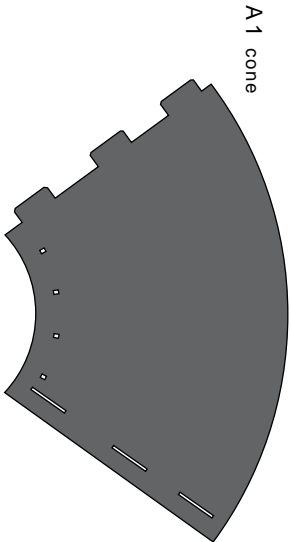
small bags (transparent): polyethylene cup (transparent): polyethylene terephthalate

Vinyl chloride resin is used for the covers of the lead wires.

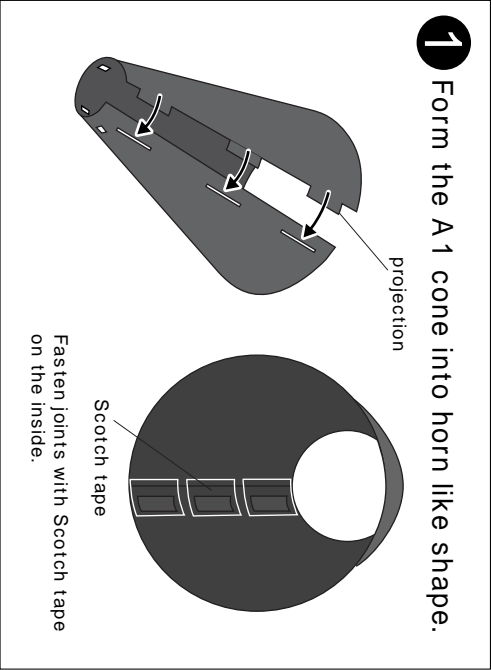
When disposing of the kit, please follow the recycling regulations in your area.

# 1 Assembling the Horn

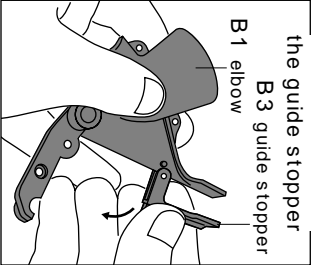
Parts to be used **PARTS A**



Figure—1  
Roll up the A1 cone and put three projections into three holes to make into horn like shape. Fasten with Scotch tape on the inside.

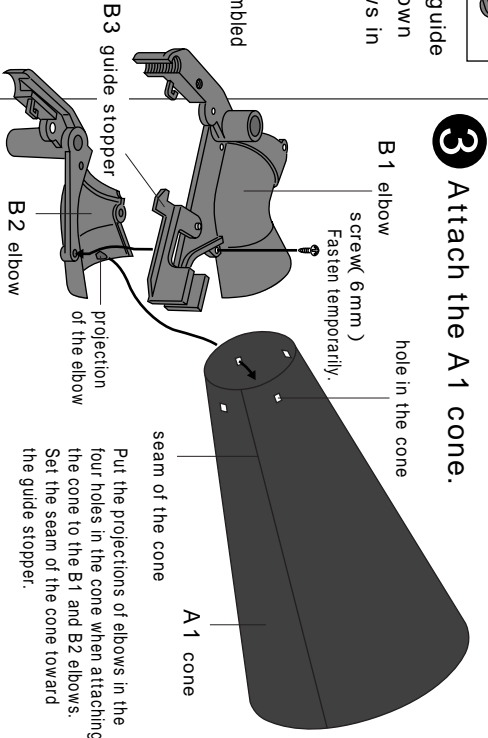


Figure—2  
Attach the B3 guide stopper to the B1 elbow.

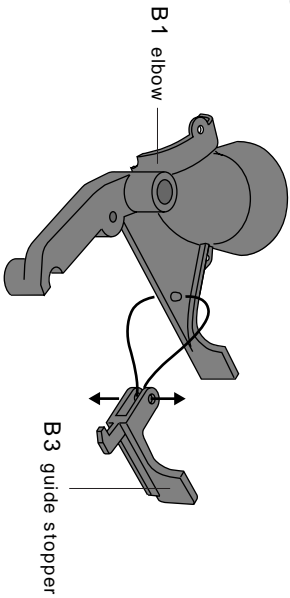


To attach the B3 guide stopper, push it down as the arrow shows in the figure above.

Figure—3  
Put the A1 cone assembled in the Figure—1 between the B1 elbow and the B2 elbow and fasten temporarily with a 6mm screw.



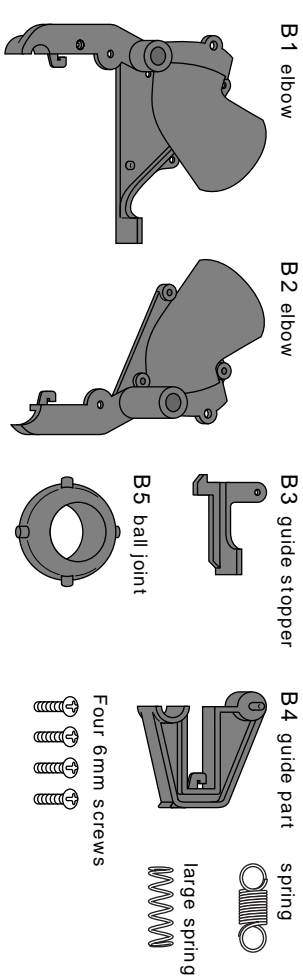
## 2 Attach the B3 guide stopper.



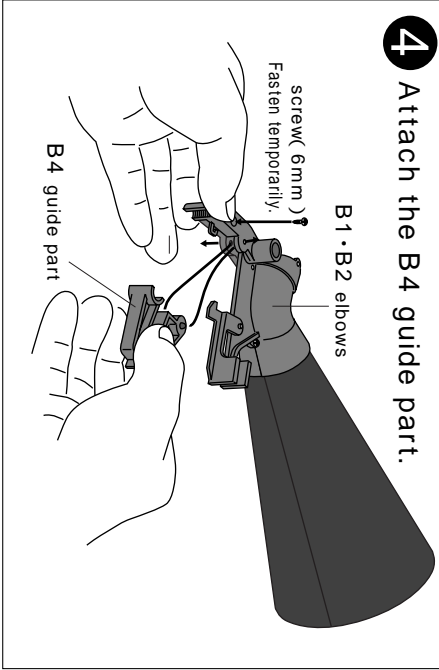
## 2 Assembling the guide part

Parts to be used **PARTS B**

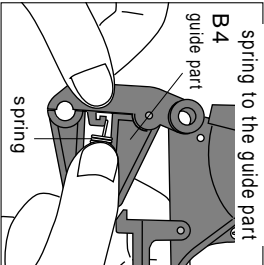
There may be more screws than actually used for spare.



Figure—4  
Make space between the B1 and the B2 elbows that are temporarily fastened and thrust the B4 guide part and fasten with a 6mm screw temporarily.

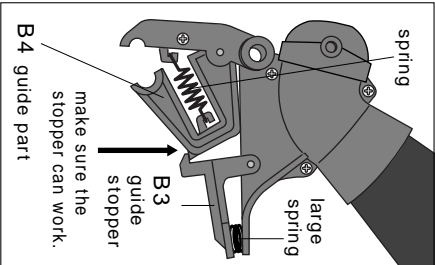


**Figure—⑤**  
Stretch and set the spring between B1 B2 elbows and B4 guide part assembled in Figure—④.

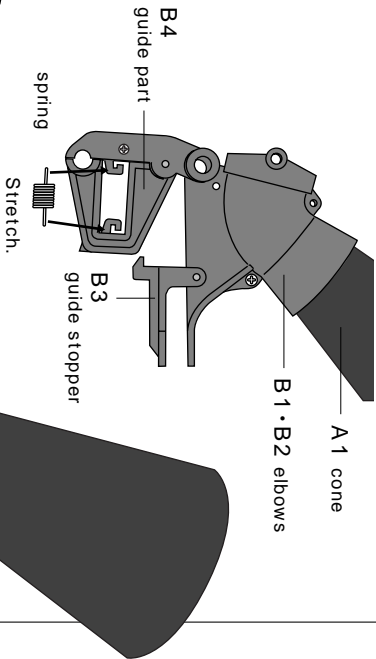


**Figure—⑥**  
Open between the B1 and the B2 elbows a little and put the ball joint in. Then fasten with two 6mm screws. Tighten the screws fastened temporarily in Figure—③ and ④.

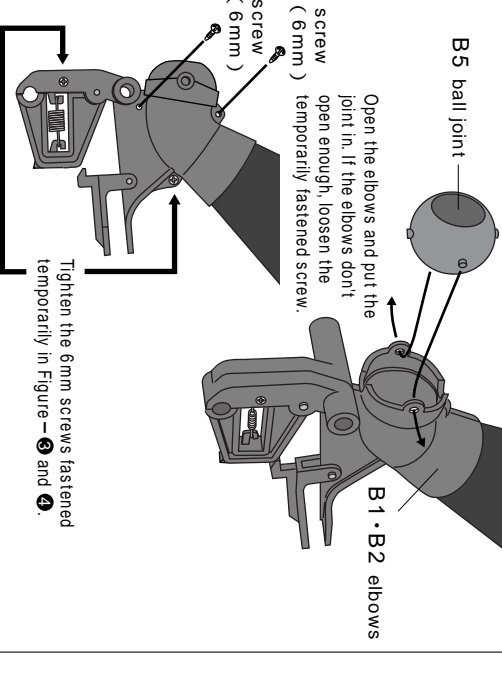
**Figure—⑦**  
Put the large spring in between B1, B2 elbows and the B3 guide stopper and see if the B3 guide stopper can catch the B4 guide part.



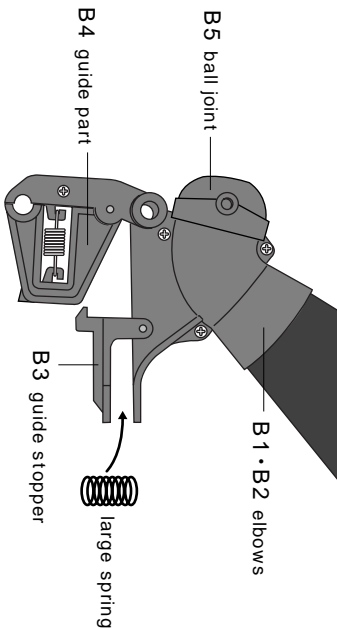
## 5 Attach the spring to the B4 guide part.



## 6 Attach the B5 ball joint.



## 7 Attach the large spring to the B3 guide stopper.

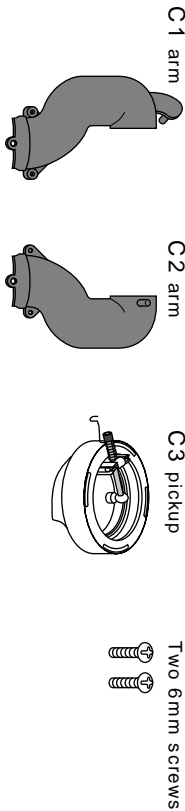


## 3 Assembling the arm parts

Gakken

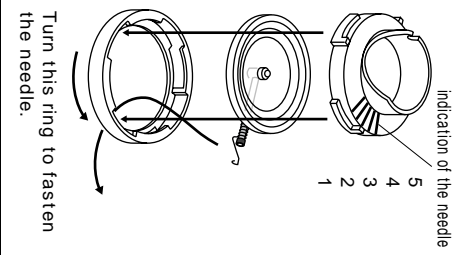
### Parts to be used **PARTS** ㉔

There may be more screws than actually used for spare.



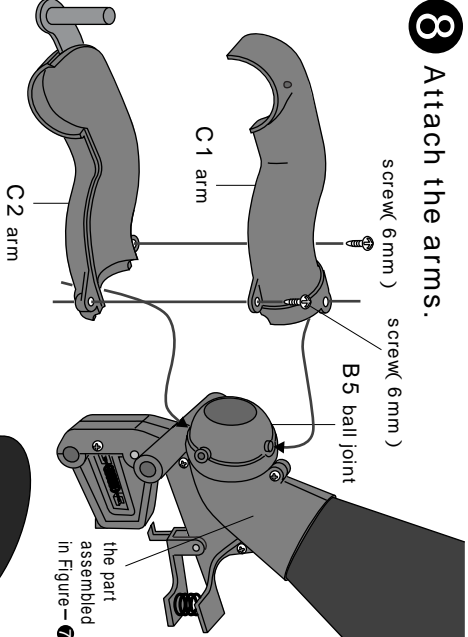
**Figure—⑧**  
Put the ball joint part assembled in Figure—⑦ between the C1 and the C2 arms and fasten with 6mm screws.

**How to assemble the pickup part**  
In case the pickup comes apart, assemble in this order.

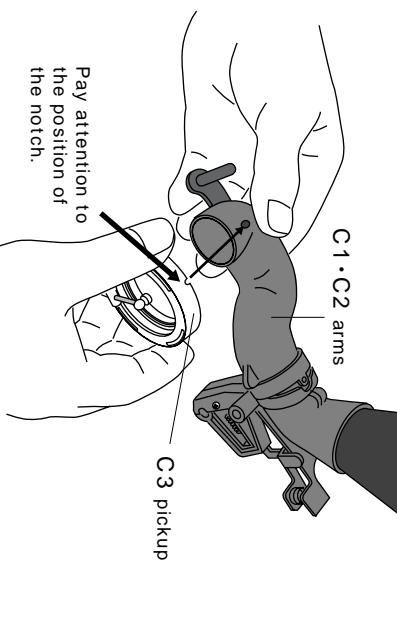


**Figure—⑨**  
Attach the C3 pickup to the parts assembled in Figure—⑧. Pay attention to the position of the notch and push the pickup in. (It may be hard to push. Insert completely.)

## 8 Attach the arms.



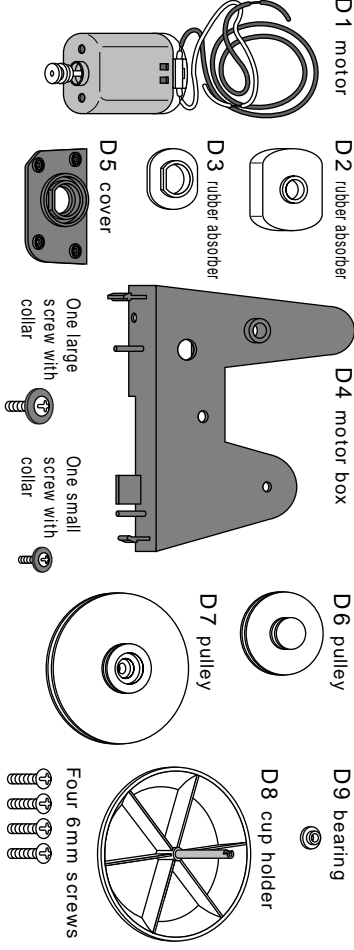
## 9 Attach the C3 pickup.



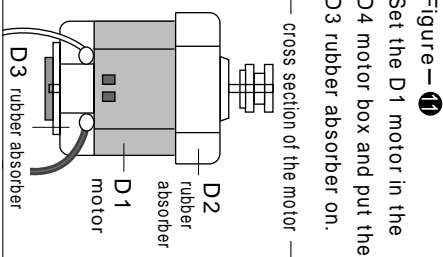


# 4 Assembling the motor box

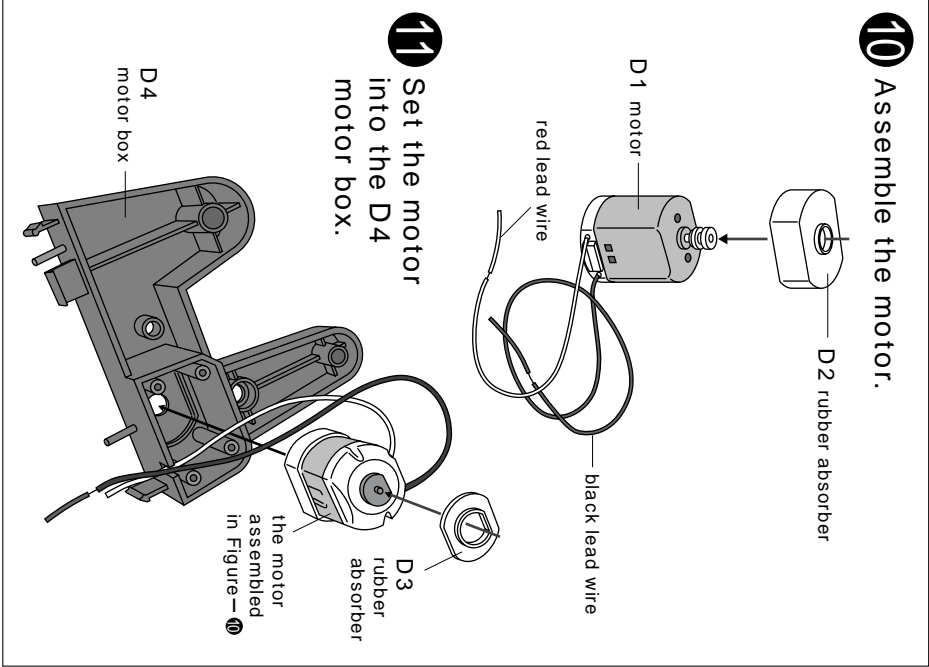
**Parts to be used** *PARTS* There may be more screws than actually used for spare.



**Figure—10**  
Put the D2 rubber absorber on the D1 motor.



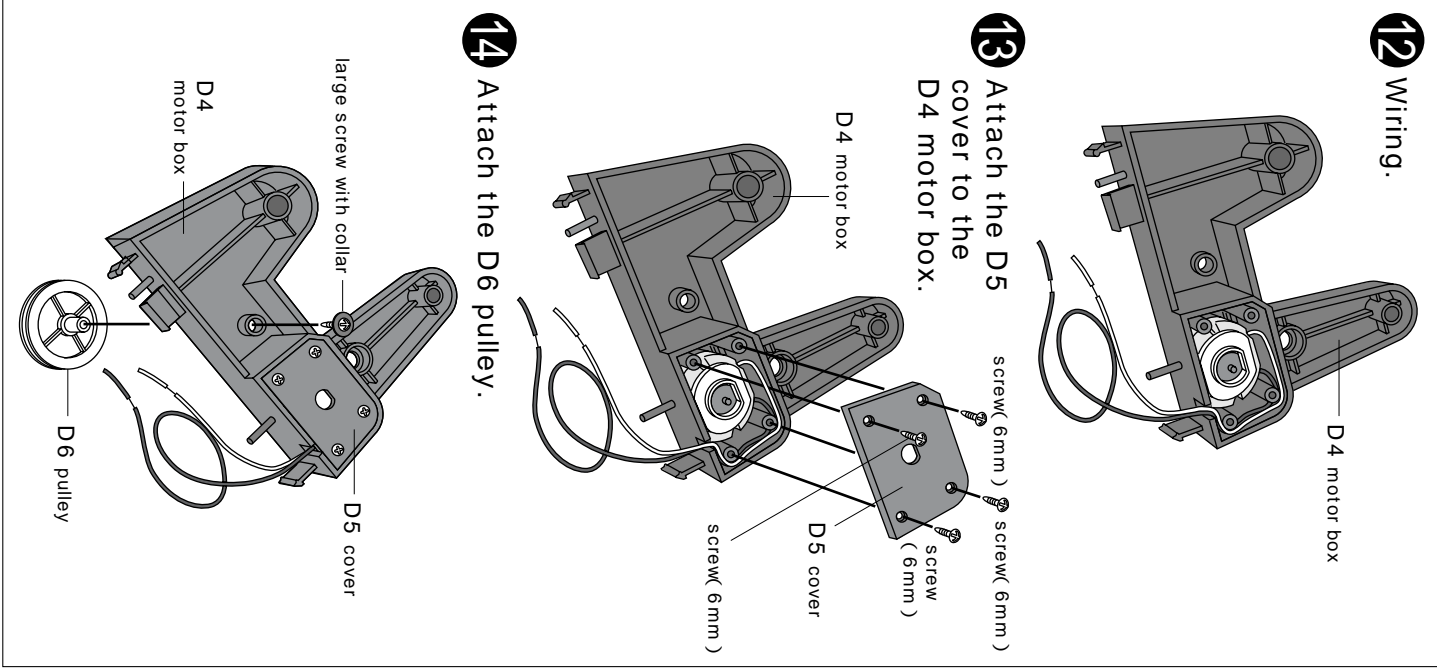
**Figure—11**  
Set the D1 motor in the D4 motor box and put the D3 rubber absorber on.



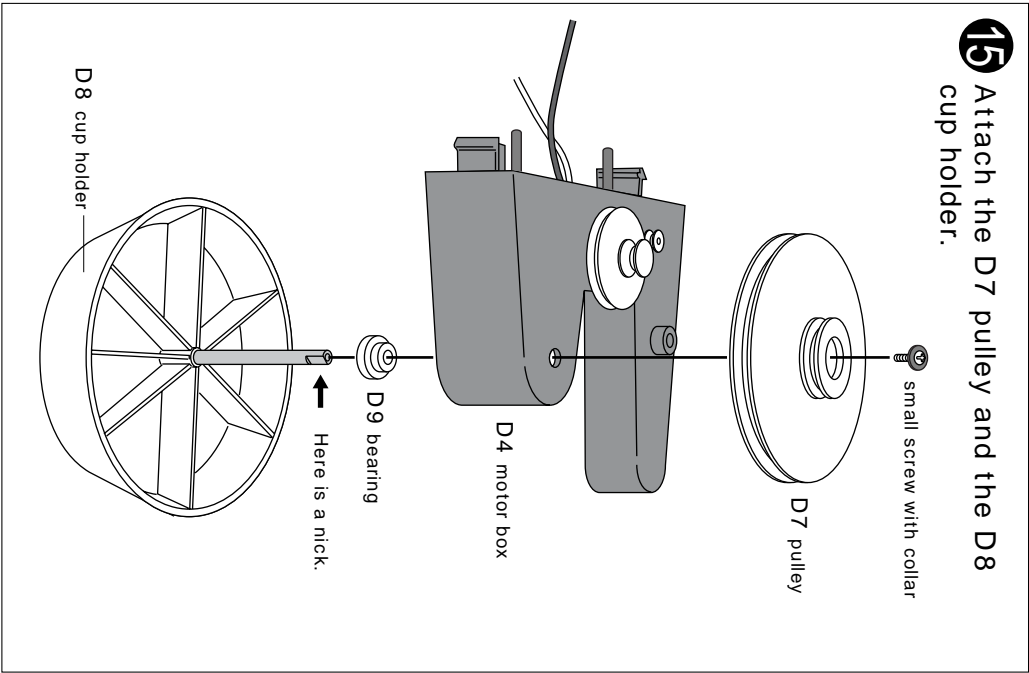
**Figure—12**  
Wire the red and the black lead wires coming from the motor as shown in the right figure.

**Figure—13**  
Attach the D5 cover to the assembled D4 motor box with four 6mm screws.

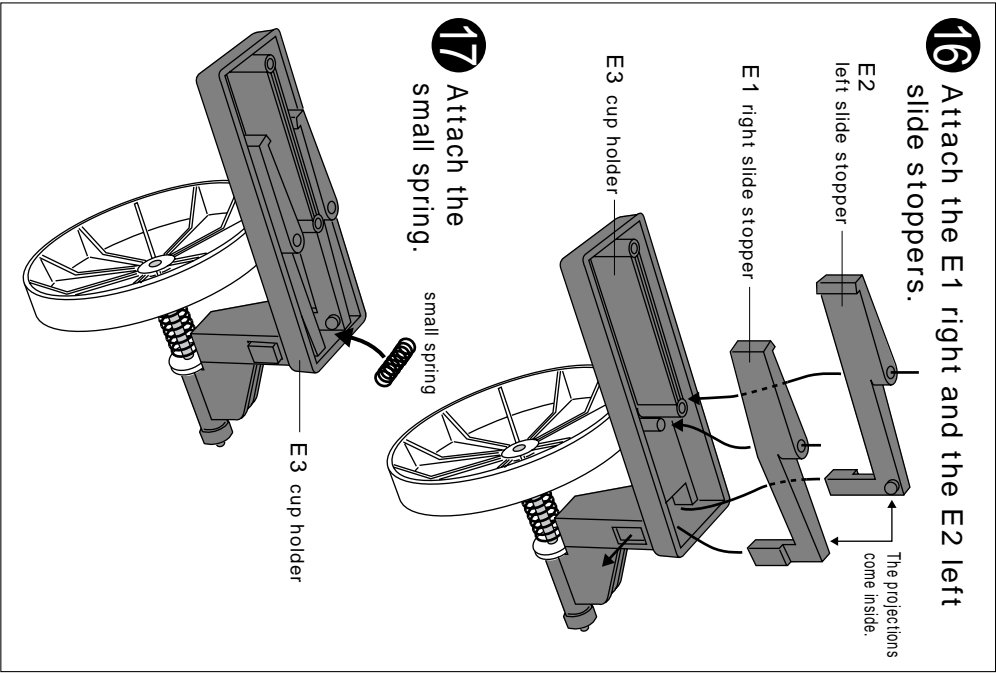
**Figure—14**  
Attach the D6 pulley to the D4 motor box with the large screw with collar.



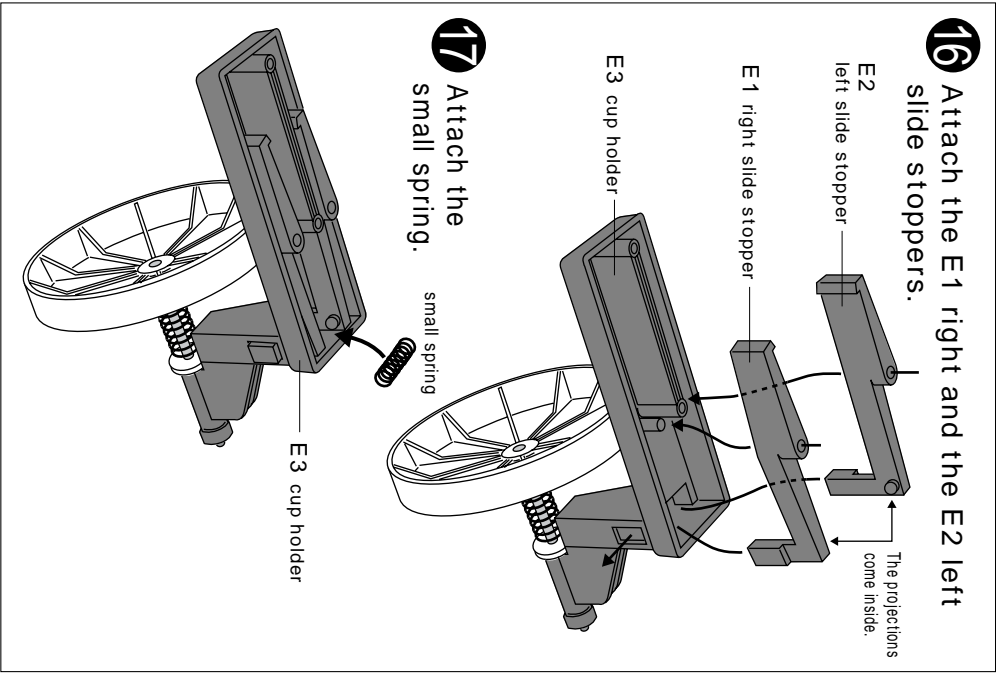
Figure—15  
Attach the D9 bearing to the D8 cup holder and the D7 pulley on these and fasten with the small screw with collar.



Figure—16  
Attach the E1 right and the E2 left slide stoppers to the E3 cup holder.

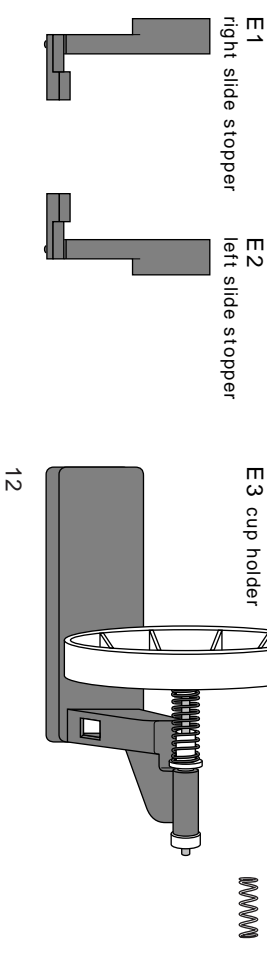


Figure—17  
Put the small spring in between the E1 right and the E2 left slide stoppers.

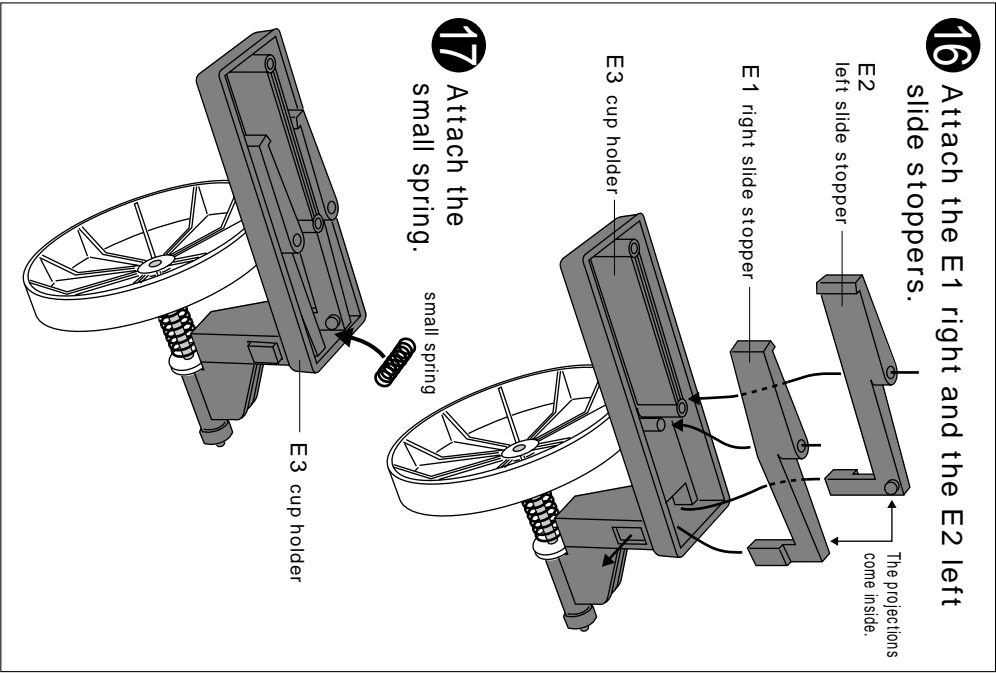


## 5 Assembling the cup holder

### Parts to be used PARTS E



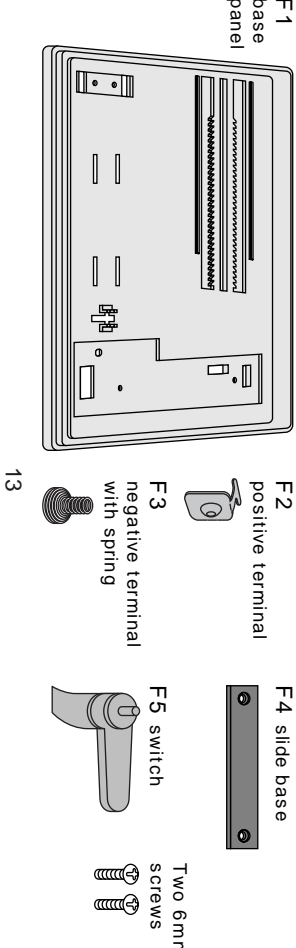
Figure—18  
Attach the E1 right and the E2 left slide stoppers.



## 6 Attaching parts to the base panel

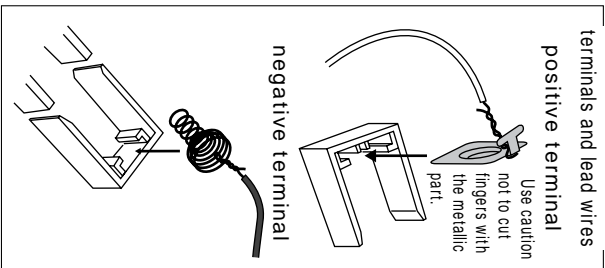
### Parts to be used PARTS F

There may be more screws than actually used for spare.



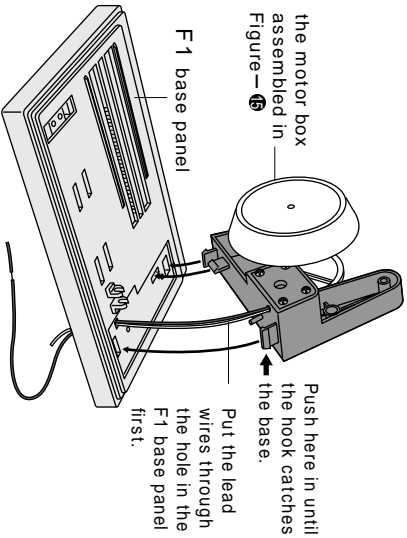
**Figure—18**  
Set the motor box  
assembled in **Figure—16**  
on the F1 base panel.

**Figure—19**  
Turn the base panel over.  
Attach the F3 negative  
terminal with spring to the  
black lead wire and the F2  
positive terminal to the red  
lead wire, and then attach  
them to the base panel.

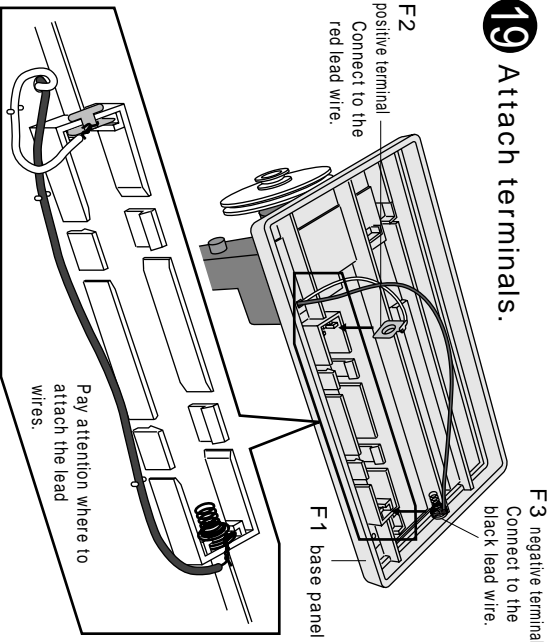


**Figure—20**  
Set the cup holder  
assembled in **Figure—17**  
on the F1 base panel.  
(Push it in pressing  
down the slide buttons  
on both sides.)

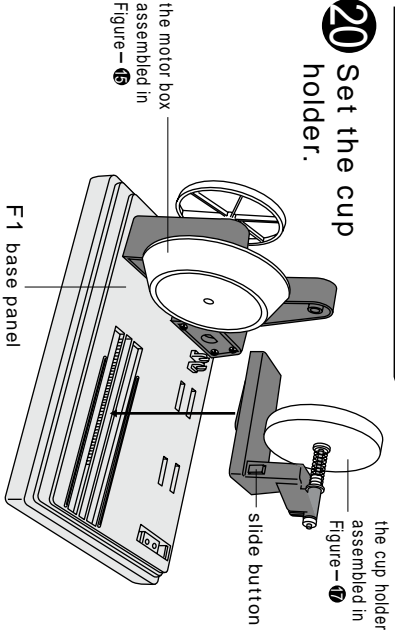
## 18 Set the motor box.



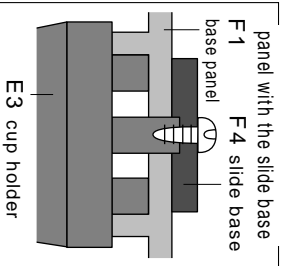
## 19 Attach terminals.



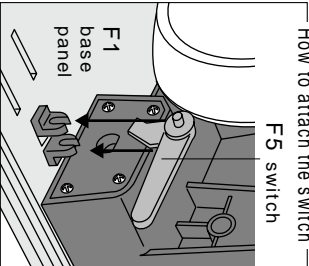
## 20 Set the cup holder.



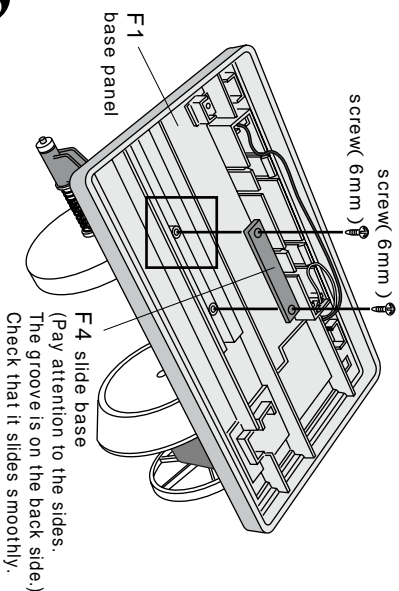
**Figure—21**  
Turn the F1 base panel over  
again and attach the F4 slide  
base with two 6mm screws.



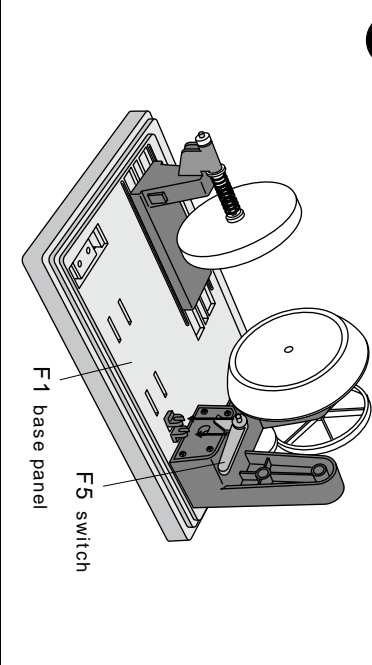
**Figure—22**  
Attach the F5 switch to  
the F1 base panel. (Press  
down until it clicks in.)



## 21 Fasten the cup holder with the F4 slide base. (Don't screw too tight.)

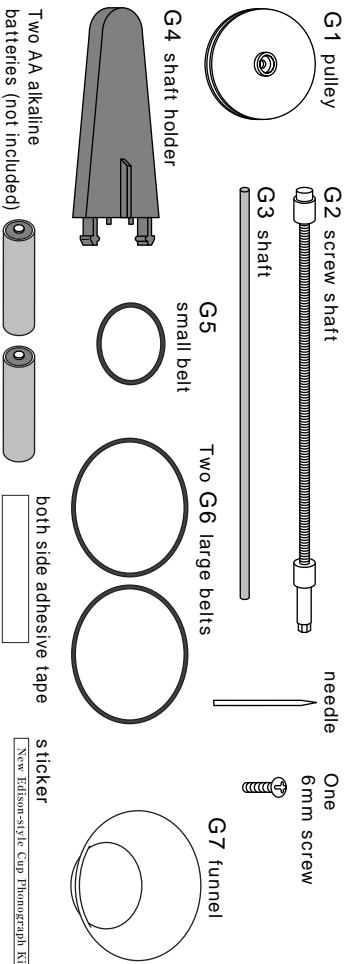


## 22 Attach the F5 switch.



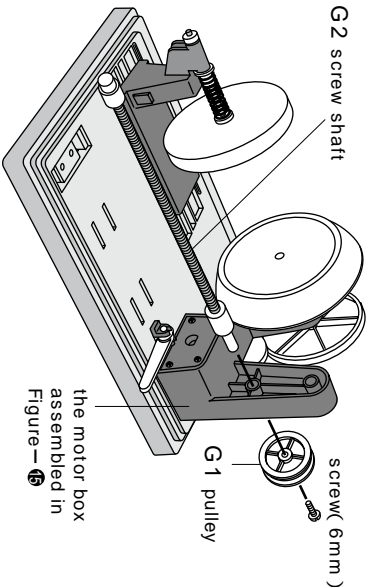
# 7 Attaching Shafts to the F1 Base Panel

**Parts to be used** **PARTS** There may be more screws than actually used for spare.

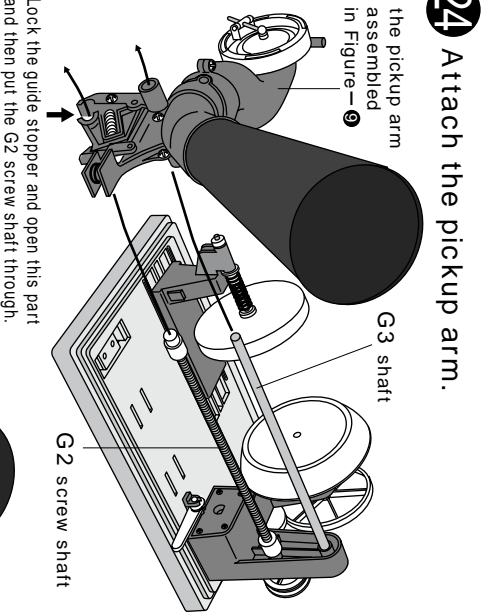




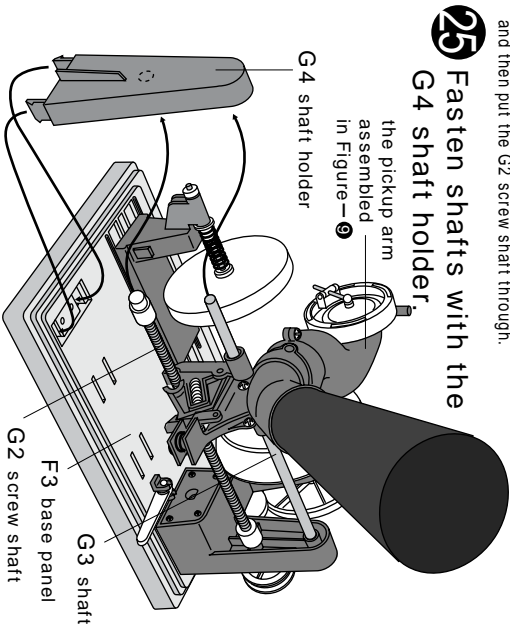
**Figure—23**  
Attach the G1 pulley and the G2 screw shaft to the motor box assembled in **Figure—15** with a 6mm screw.  
Hold the G1 pulley not to turn when screwing.



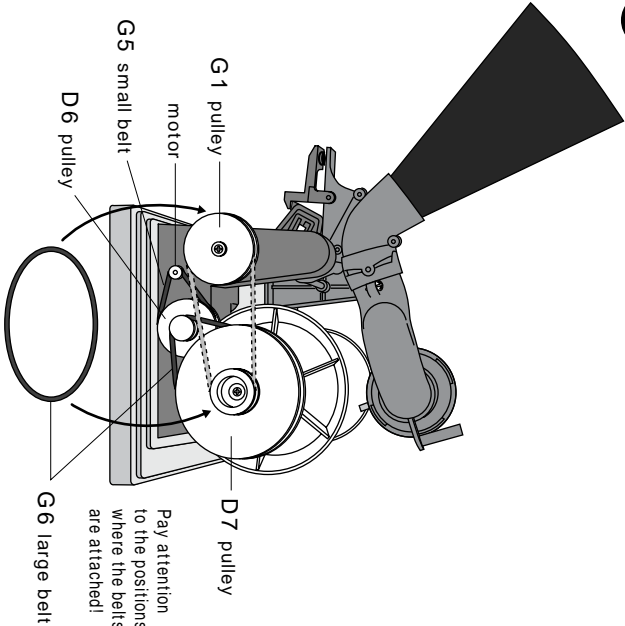
**Figure—24**  
Attach the G3 shaft to the motor box assembled in **Figure—15**.  
Then put the G3 shaft and the G2 screw shaft through the pickup arm assembled in **Figure—9** in the guide stopper locked condition.



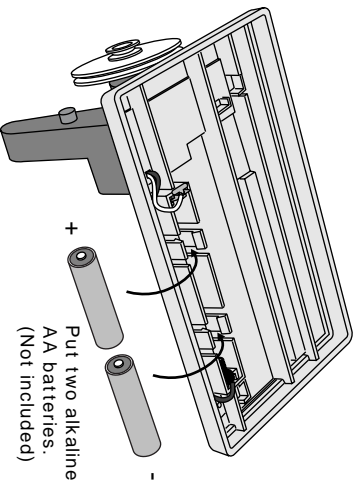
**Figure—25**  
After the pickup arm was attached, fasten the shafts with the G4 shaft holder to the F3 base panel.



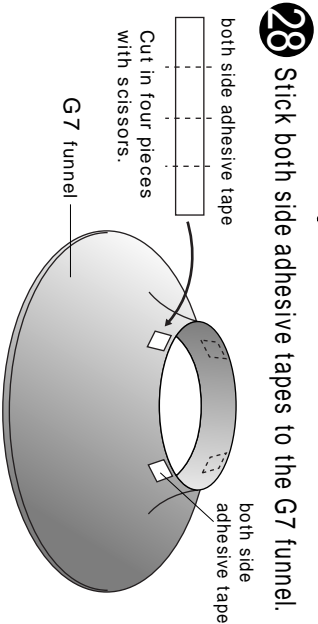
**Figure—26**  
Set the belts as shown in the right figure.  
G5 small belt the motor and the D6 pulley  
G6 large belt the D6 pulley and the D7 pulley  
G6 large belt the D7 pulley and the G1 pulley



**Figure—27**  
Put new batteries in and check the motion of the motor.

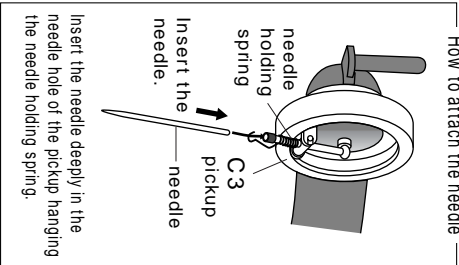


**Figure—28**  
Cut the both side adhesive tape in four pieces and stick to the four places of the G7 funnel.



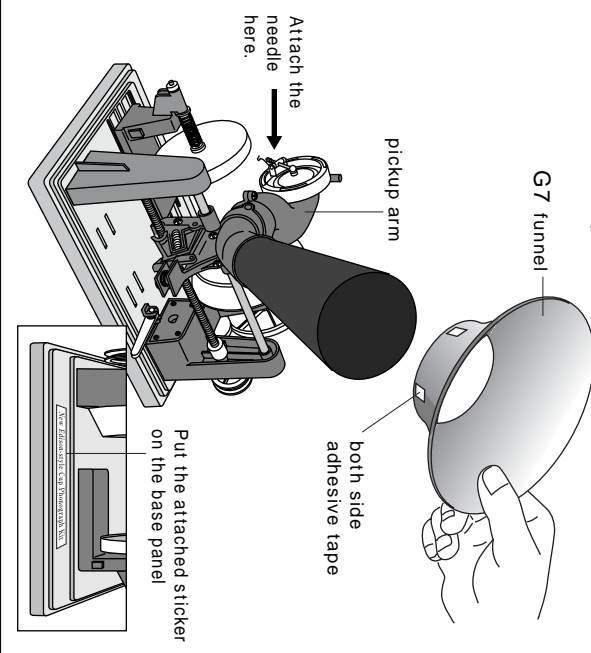
Figure— 29

Peel off the separating sheets of the both side adhesive tapes and attach the G7 funnel to the cone. Attach the needle and then put the sticker on the base panel.



29

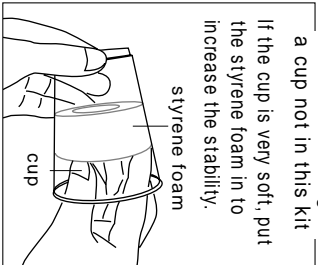
Attach the funnel to the cone and the horn is complete.



## 8 Recording

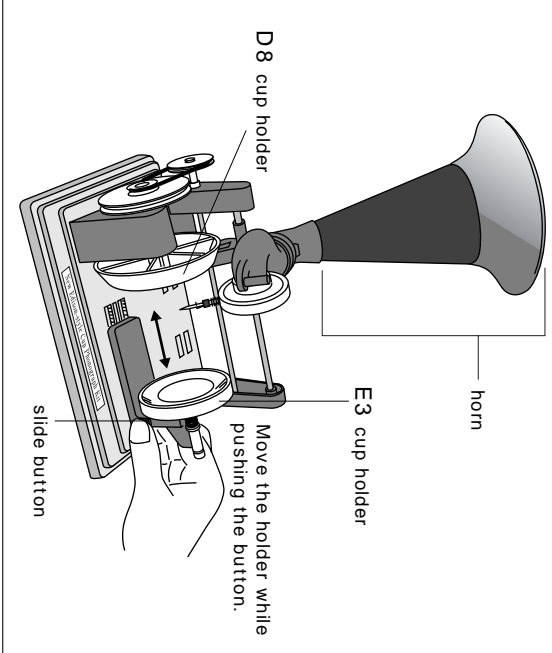
Figure— 30

When setting a cup, push the slide button to move the holder as shown in the figure.



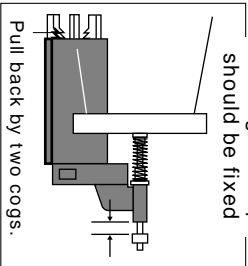
30

How to adjust when setting the cup.



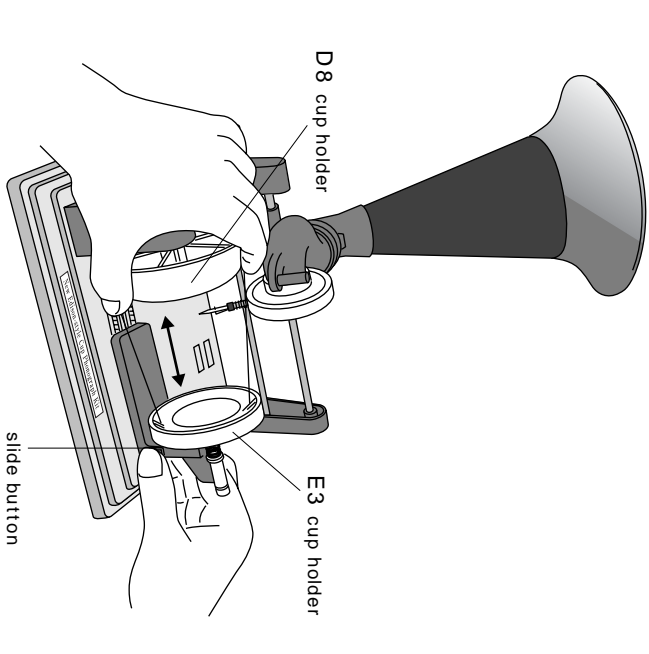
Figure— 31

Slide the E3 cup holder to fix a cup. First, press the holder against the cup and then pull back by two cogs of the gear.



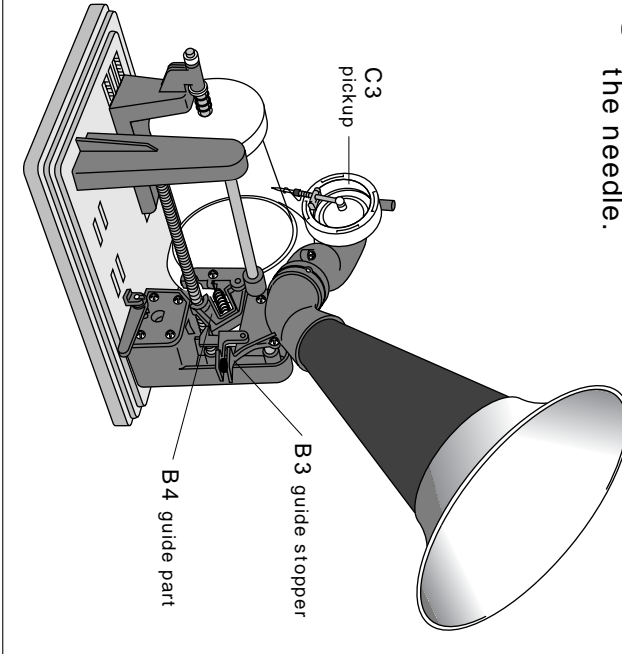
31

Set a cup.

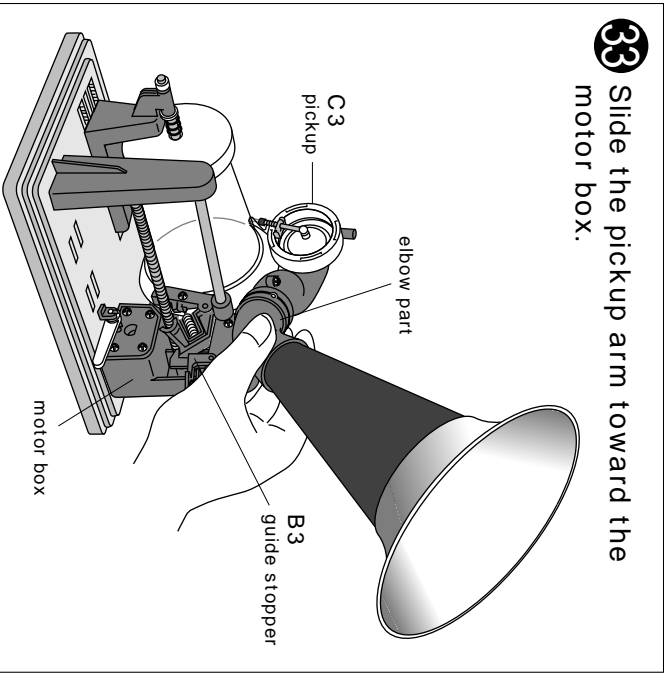


32

Adjust the angle of the needle.

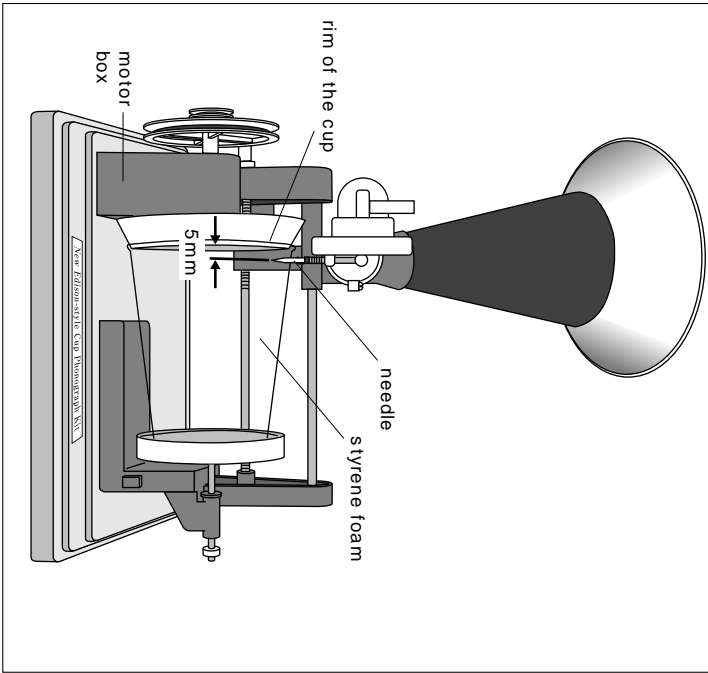


Figure—33  
Push up the B3 guide stopper lightly. Slide the pickup arm toward the motor box holding the elbow part.

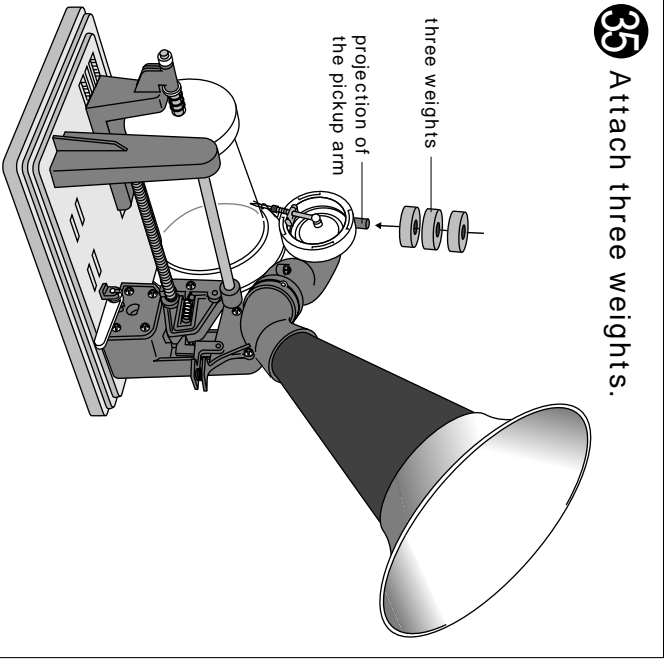


33 Slide the pickup arm toward the motor box.

34 Check the point where the needle tip is placed.

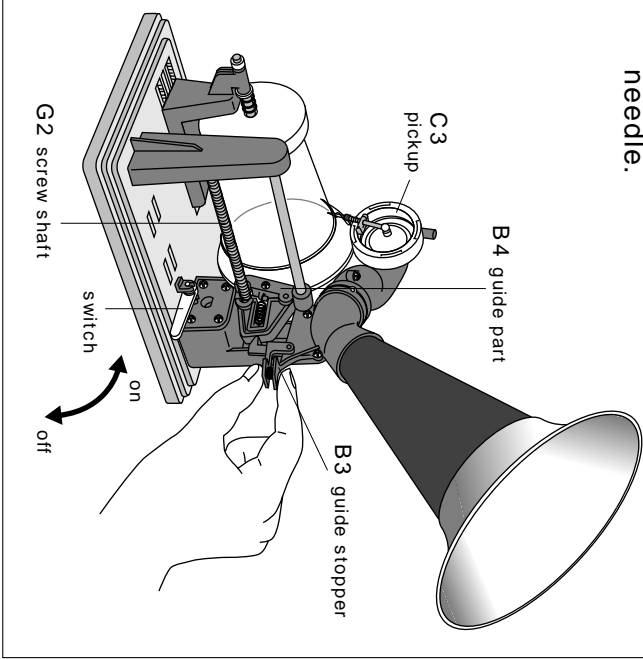


Figure—35  
Attach three weights to the pickup arm.

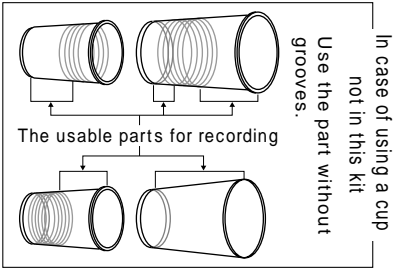


35 Attach three weights.

36 Turn on the switch. Pinch the B3 stopper to undo the stopper holding the B4 guide part and put down the needle.



Figure—37  
Check if the needle comes to the position 5mm apart from the rim of the cup when it is placed as shown in the figure.



Figure— 37

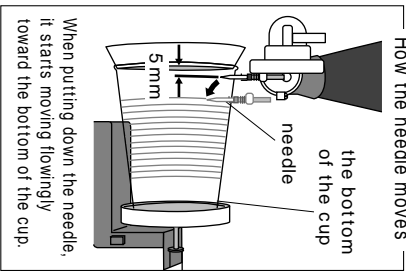
Bring your mouth as close as possible to the horn (till it almost touches the horn.) Record a message or a song in as clear voice as possible. The recording capacity of the cup in the kit is about 50 seconds.

Do not turn off the switch during the recording. (If you once turn off the switch and start recording again, the needle may make two grooves and replay may not go successfully.)

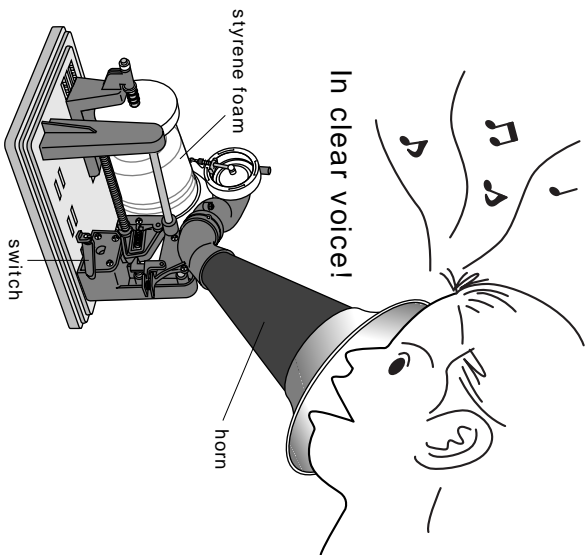
Figure— 38

Remove two weights before replay and leave one weight only. Set the guide stopper and slide the horn toward the motor box (to the position shown in the figure).

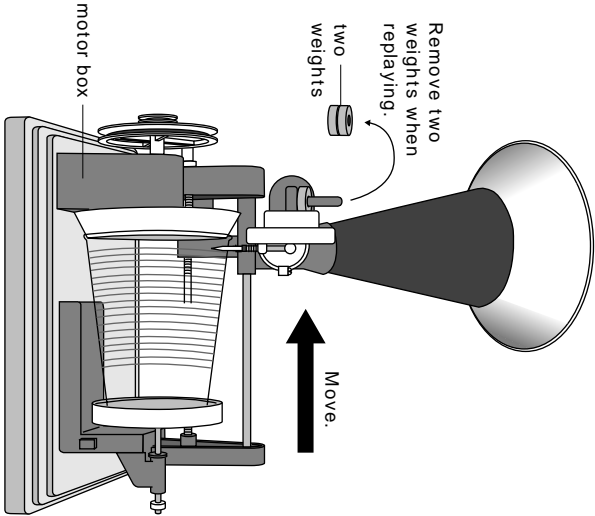
Turn on the switch. Release the stopper and place the needle quietly on the point recorded groove on the cup starts.



37 Recording.



38 Replay.



Figure— 39

When it isn't possible to record or replay, or when noise is too loud, change the angle of the needle. (Level 3 is the normal angle.) When you make the angle bigger, the groove becomes deeper and the smaller, the shallower. (Level 1 is the biggest angle and level 5 is the smallest angle.)

Figure— 40

A sewing needle can be used as a needle for this phonograph. In case you need to change a needle, insert a sewing needle after attaching the sewing needle adapter as shown in the figure.

The size of a replacement needle must be 0.84mm in diameter and 45.5mm in length.

A needle can be used for recording normally more than thirty times, but the change of the needle is necessary in case sound quality deteriorates or the needle skips.

39 How to adjust the angle of the needle.

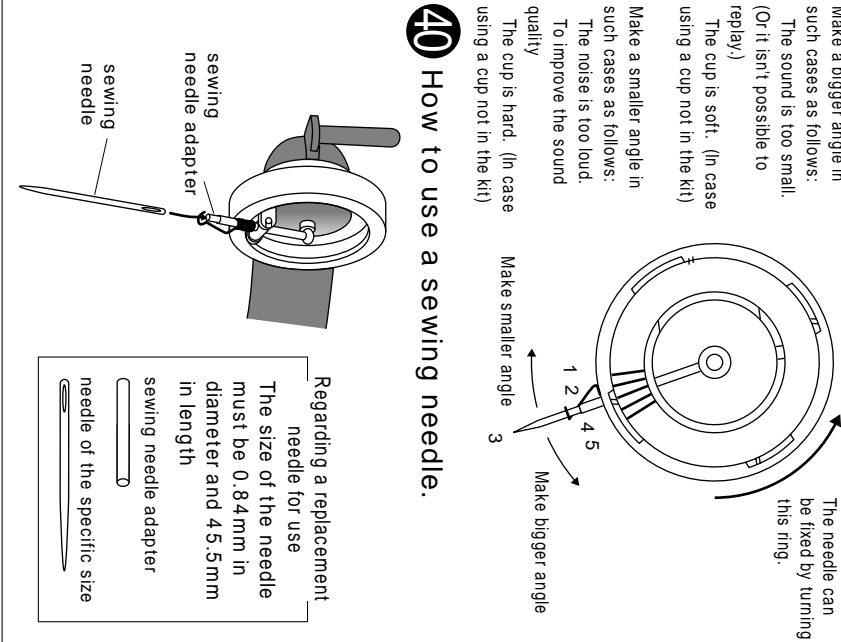
Make a bigger angle in such cases as follows:  
The sound is too small.  
(Or it isn't possible to replay.)

The cup is soft. (In case using a cup not in the kit)

Make a smaller angle in such cases as follows:  
The noise is too loud.  
To improve the sound quality

The cup is hard. (In case using a cup not in the kit)

40 How to use a sewing needle.



## Trouble Shooting New Edison-style Cup Phonograph Kit

Q 1 : The needle doesn't start carving a groove when turning on the switch.

A 1 : Wait for a while. After a moment, the needle will start moving. Make sure the needle starts moving, and then record. (If it just will not start, check the direction of batteries.)

Q 2 : When recording, the cup doesn't turn though the D8 cup holder turns.

A 2 : See Figure—31 in p.19 and adjust the E3 cup holder.

Q 3 : The needle doesn't trace a groove when replaying.

A 3 : The groove might be too shallow. See Figure—39 in p.23 and adjust the angle of the needle. Then, see Figure—35 in p.21 and Figure—37 in p.22 for recording minding the number of the weights and the volume of voice.