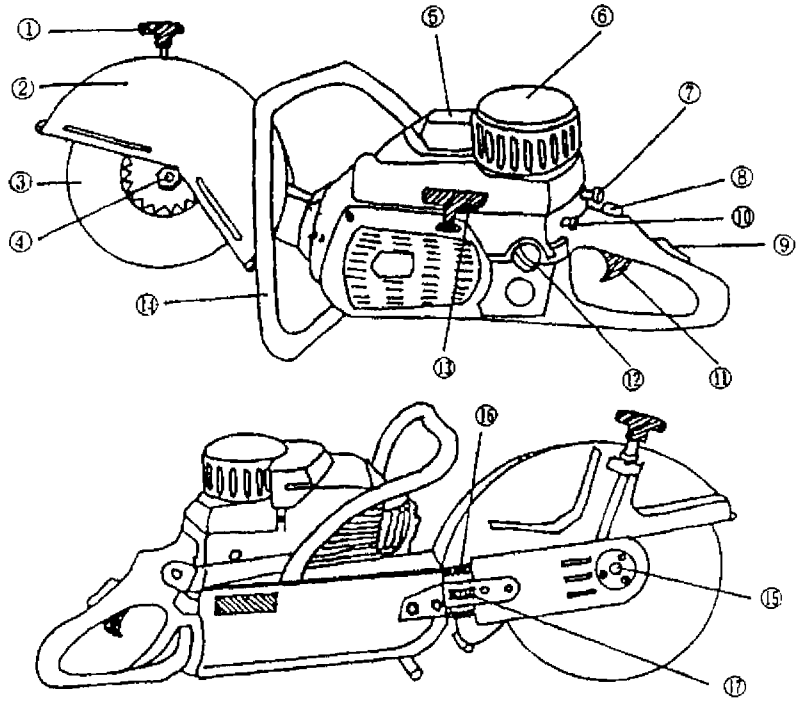
4. Engine cutters

An engine cutter is a portable cutter driven by a small engine. An engine cutter can cut iron and concrete blocks with the cutting blade (disc) which rotates at high speed. Engine cutters are used to remove debris, etc. at a disaster site to facilitate rescue activities.

A. Name of each part (an example of engine cutter by maker H)

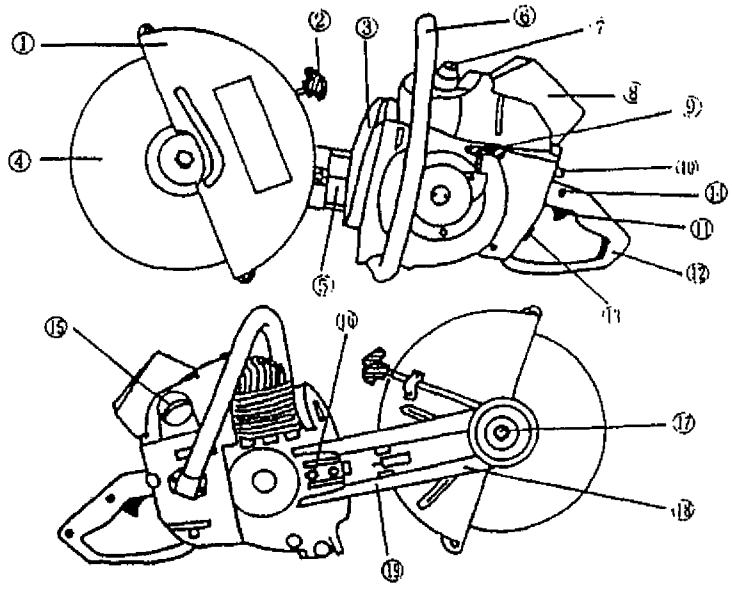


1 Protect cover adjusting screw
2 Protect cover
3 Disc (blade)
4 Disc set nut
5 Plug cover (plug)
6 Air filter
7 Chalk button
8 Throttle button
9 Throttle lock button
10 Stop button
11 Throttle lever
12 Fuel cap
13 Starter grip
14 Handle bar
15 Bearing housing
16 V-belt
17 Belt adjusting screw

B. Main unit specification

Engine	2-cycle air-cool type	Disc diameter	305mm (12")
Cylinder volume	77cc	Disc rotation speed	4,400rpm
Engine speed	8,000rpm	Starter	Manual start-up
Fuel ratio	25:1 (2-cycle engine oil)	Fuel tank volume	0.85 ℓ
Fuel consumption	Approx. 0.8 ℓ /h	Weight	12.5kg

A. Name of each part (an example of engine cutter by maker P)



1 Protect cover
2 Protect cover adjusting screw
3 Muffler
4 Disc (blade)
5 Belt adjusting screw
6 Handle bar
7 Plug
8 Air filter
9 Starter grip
10 Stop button
11 Throttle lever
12 Handle
13 Choke lever
14 Throttle lock button
15 Fuel cap
16 Support arm set nut
17 Disc set nut
18 Support arm
19 V-belt

B. Main unit specification

Engine	2-cycle 1-cylinder air-cool type	Disc diameter	305mm (12")
Cylinder volume	85cc	Disc rotation speed	8,000rpm
Engine speed	6,000~8,000rpm	Starter	Manual start-up
Fuel ratio	25:1 (2-cycle engine oil)	Fuel tank volume	0.9 ℓ
Fuel consumption	0.9 ℓ /h	Weight	13.0kg

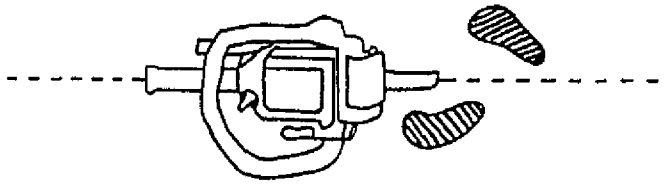
Disc

1. Types
   (1) For metals
   Used to cut shutter doors, car bodies and pipes, etc..
   (2) For non-metals
   Used to cut concrete blocks, brick walls, etc..
   Discs for non-metals can cut both concrete and iron, whereas discs for metals cannot cut concrete blocks.

2. Materials
   (1) For metals
   The grinding particles of disc for metals is made of alumina. Inside and side surfaces of the disc are strengthened with glass fibers. All these materials are bonded with adhesive agent.
   (2) For non-metals
   The grinding particles are made of silica. Other materials are the same as those of disc for metal use.

Safety precautions

1. Wear safety gear such as goggles, gloves, helmet and boots. Wear clothes made of materials which can withstand sparks generated by the cutter.
2. The disc set-nut must be securely tightened.
3. There should be no person(s) around the cutter during the cutter is in use.
4. The person who operate the engine cutter must position his/her feet as illustrated in the figure below.



5. Adjust the angle of the protect cover to prevent the cut pieces or sparks from hitting the legs of operator.
6. Cut straight. Changing cutting direction may damage the disc and is very dangerous.
7. Pressing the disc against the target with an excessive force will affect the cutting power and shorten the service life of the disc.
8. Wear protective gear such as a mask when cutting stones or concrete which may fly to bits.
9. Use proper disc for each target.
10. Any disc must be checked visually and acoustically prior to use. A disc with a flaw, damage or abnormal sound must not be used.
11. Check carefully to prevent a secondary disaster resulted from the cutting. Safety measures must be taken if there is any inflammable material in that area.

Operational procedure

Before start-up

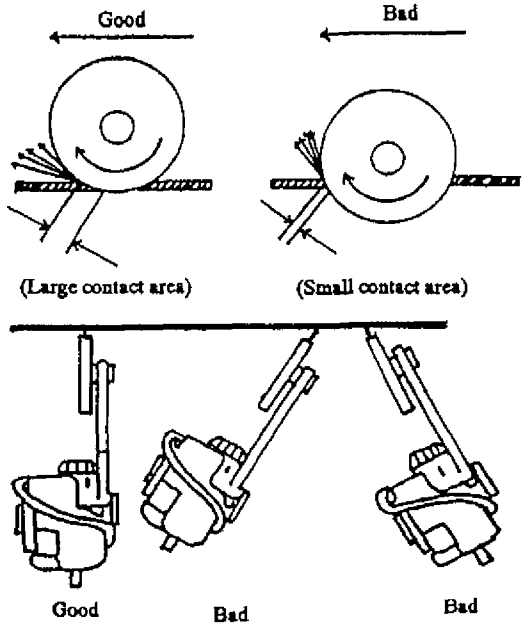
1. Make sure that there is sufficient fuel.
2. Make sure that the disc is securely tightened.
3. Turn the disc by hand to check for loosening, swinging or crack, etc..
4. Adjust the angle of the protection cover according to the target.
5. Check the tension of V-belt (proper span is approx. 10~15mm when pressed by your thumb).
6. Check the air filter for any abnormality.

Engine start

1. Close the chalk if the engine is cold.
2. Secure the cutter with your hand and foot.
3. Hold the starter grip and pull strongly from the point where the ratchet intermesh.
4. Gradually return the chalk after the engine starts.
5. Warm-up the engine if time allows.

Cutting

1. After the engine warms up, fully open the throttle and start cutting the target.
2. Do not fully open the throttle if you are not cutting the target.
3. The disc must be positioned at right angles on the target.
4. Do not change the cutting direction or twist the disc while you are cutting the target.
5. Do not press the disc against the target with an excessive force or pull it.
6. Care must be exercised so that the disc is not caught during cutting.
7. Cut the target while properly positioning yourself.



Cutter stop

1. Close the throttle.
2. Press the stop switch to stop the engine.

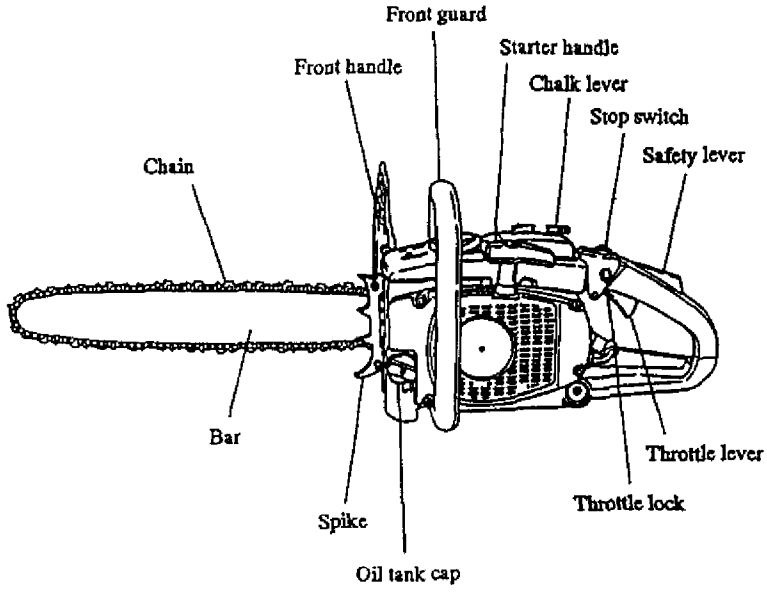
Maintenance

1. Clean and lubricate the adjusting screw of protection cover.
2. A disc completely wet with water should not be used.
3. Disconnect and check the disc. A disc with abnormal abrasion and/or damage must be replaced.
4. Clean the air filter after cutting concrete, etc.. Replace the air filter as necessary.
5. The fuel tank must be always filled up to the "full" level to prevent dew condensation inside the tank.
6. The main unit and disc must be stored at a place free of dampness.
7. Cylinder fin must be cleaned carefully to prevent the engine from being overheated.
8. A cutter must be started at least once a week even if it is not actually used.
9. A disc must be stored in a manner so that the disc does not come into contact with other machines, unit and materials, etc..

5. Chain saw

A chain saw consists of a small engine and a belt-like blade driven by the engine. A chain saw is used to cut down trees and woods at a disaster site caused by typhoon, flood or earthquake, etc..

A. Name of each part



B. Main unit (Maker C)

Item			Specification
Engine	Type of engine		Air-cool 2-cycle single cylinder
	Max. output (ps/rpm)		2.0/8,000
	Total emission (cc)		36.3
	Starting method		Rope type (automatic wind-up)
	Ignition method		Electronic ignition
	Fuel	Type (gasoline: 2-cycle engine oil)	Gasoline mixture (25:1)
		Tank capacity (ℓ)	0.35
	Continuous service time (min)		20
Transmission			Automatic centrifugal clutch
Chain bar length (mm)			Approx. 400
Chain oil tank capacity (ℓ)			0.15
Weight			4.8

Safety precautions

Before use

1. To prevent unnecessary abrasion of blade, remove the dirt or mud on the wood or lumber before cutting.
2. Fuels must not be mixed in the fuel tank. They must be mixed in a separate tank and then fed into the fuel tank.
3. Chain oil should also be replenished whenever the fuel is replenished.
4. If it is necessary to remove the fuel cap whilst the engine is still hot, loosen the cap by a half-turn, wait for 30 seconds to allow the gases trapped inside the tank to escape, and then open the cap. (If the cap is removed all at once, the residual fuel may gush out with the gases due to the pressure of the fuel.)
5. If time allows, warm-up the engine for 2~3 minutes before starting cutting.
6. Check the chain for damage such as a crack.
   Make sure that the tension is proper.

During use

1. NEVER use a chain saw in a basement or indoor place, etc. where ventilation is poor or emission gas is trapped.
2. A chain saw can be used in any direction. However, use of chain saw upside down for long time should be avoided as far as possible.
3. If the forward end of a chain saw hits an obstacle during cutting, the chain saw may jump up. Hold the chain saw with your both legs and exercise extreme care during cutting.
4. Abrasion of chain and/or chain guide bar will be accelerated if you cut things with the forward end or upper side of the chain.
5. When putting chain saw on wood, the throttle must be fully pulled??

Operational procedure

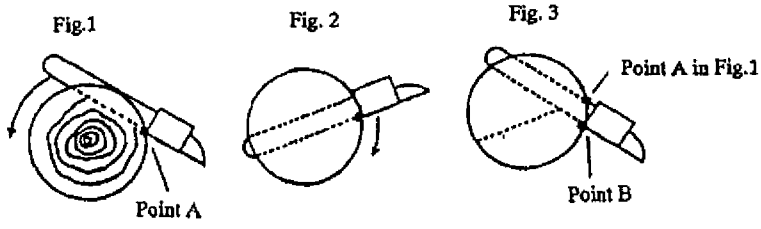
Engine start

1. Set the switch to "ON", pull the chalk button to the end, pull the throttle lever and lock.
2. Securely fix the main unit, hold the starter grip, and tug the starter rope when the ratchet intermesh. (Do not pull out the starter rope to the end. When returning the rope, keep holding the starter grip and gradually return the rope.

3. Giving 1~5 pulls on the rope will start the engine. If the engine stops although it seemed to start once, return the chalk by half and pull the starter grip again. Once the engine starts, return the throttle lever to "slow" and then return the chalk button according to the warm-up condition of the engine.
4. To stop the engine, set the engine switch to "OFF". When restarting the engine which has already been warmed up, it is not necessary to pull the throttle lever and chalk button.
   When restarting the engine which is already cooled off, remove the fuel cap and feed air to the tank, which is not vacuum states, to improve the fuel flow.

Cutting

Fundamental cutting method



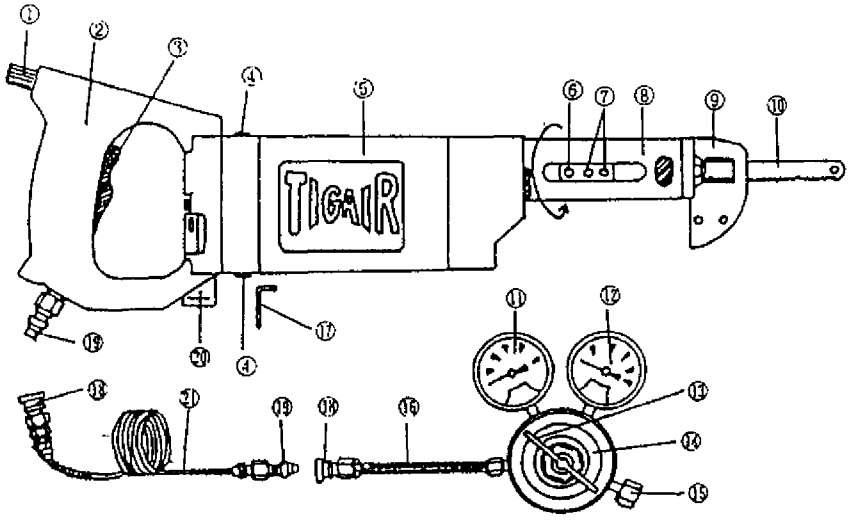
(1) First, cut the wood to a fan-shape by supporting the chain saw at point A. When the blade comes to the position shown in Fig. 2, change the supporting point to B (lower the main unit without stopping the engine.) Start cutting again as shown in Fig.s 1 and 2.

(2) A lumber or wood laid down on the ground can be cut from up to down. However, if the lumber or wood is supported at one end, cut from below to a depth of 1/3 and then cut if off from above.
   If a lumber or wood is supported at the both ends, first cut it from above to 1/3 the diameter and then cut it off from below.
   If the lumber or wood is very thick, use wedges to cut it off.

6. Air saw

An air saw is a portable saw which can cut iron, stainless steel, light alloy and other non-ferric metals. The air saw is driven by compressed air supplied by a compressor or an air container.

A. Name of each part

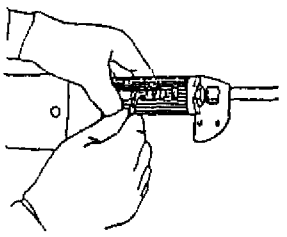
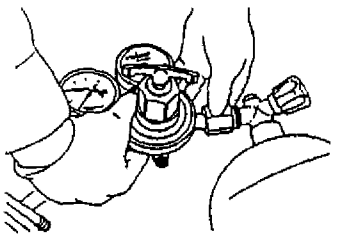


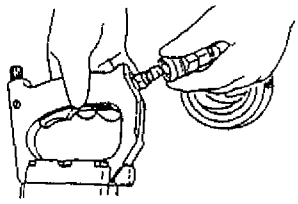
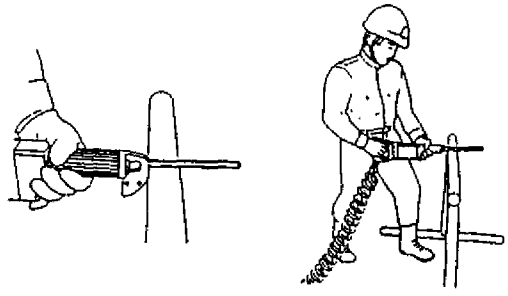
1	Speed control knob	8	Silencer	15	Air container connection port (nut)
2	Grip	9	Nose	16	Air hose
3	Trigger	10	Blade	17	Blade set wrench
4	Valve screw	11	Low pressure gauge	18	Coupler (female)
5	Main unit	12	High pressure gauge	19	Coupler (male)
6	Blade-in check hole	13	Pressure control handle	20	Oil trap cut
7	Blade set screw	14	Pressure reducer	21	Coil hose

B. Specifications

Main unit	Length (main unit only)	425mm
	Width	42mm
	Height	140mm
	Weight	2.7kg
	Air pressure	0.65～0.7 MPa
	Blade speed	1200 cycles/min. (freely adjustable between 0～1200 cycles)
	Blade stroke	45mm
	Air consumption	180 ℓ /min (can run for approx. 5 minutes with 1 8 ℓ container filled at 12 MPa)
	Lubrication	Incorporated automatic lubricator
	Blade cooling	Cooling by air blow (Less frequent generation of spark due to small heat generation during operation)
Accessories	Blade length	250mm and 300mm
	Blade types	14 pitches, 18 pitches, 24 pitches and 32 pitches per inch
	Oil	Oil specific for air saw
	Coil hose	7m x 3pcs. (pressure endurance of approx. 1.5 MPa)

C. Mounting air container to main unit (by 2 persons)

	Person #1	Person #2
1	Take the air saw and saw blade from the box and securely mount the saw blade to the main unit. "Saw blade connection OK." 	Take the regulator and coil hose from the storage box and connect the regulator to the air container. "Regulator connection OK." 

	Person #1	Person #2
2	Take one end of the coil hose from the person #2 and connect it to the air saw main unit. "Air saw connection OK" 	Connect the coil hose to the regulator. "Coil hose connection OK" Give the other end of the coil hose to person #1.
3	Bring the air saw to the cutting site and be ready for cutting. "Cutting ready." 	Make sure that the pressure regulating valve is open in counterclockwise direction, open the cylinder valve and check the pressure. "Pressure ○○ MPa" Control the pressure regulating valve to the specified pressure. "Pressure setup ○○ MPa"

D. Features

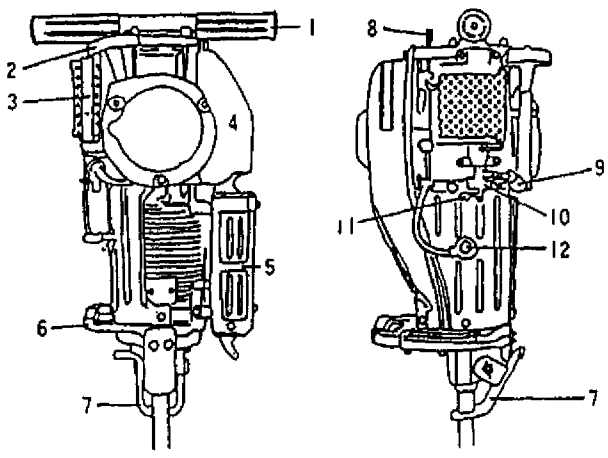
1. An air saw can be used even in an area with flammable materials due to no spark generation and extremely low heat generation.
2. Due to its light weight, an air saw can be used with one hand even when secure footing is available.
3. An air saw does not generate much noise and can cut bent portions.
4. An air saw consists of corrosion-resistant materials and can be used even in sea water.

7. Rock drills

7-1 Engine-driven rock drills

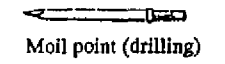
An engine-driven rock drill consists of a small engine and attachments such as drill. Concrete structures, rocks or bricks are drilled or broken by the rotation or reciprocal movements of the attachment to discharge smoke and save people.

A. Name of each part

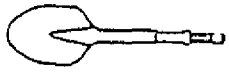


1. Handle
2. Starter
3. Air cleaner
4. Fuel tank
5. Muffler
6. Distance piece
7. Drill stay
8. Clutch lever
9. Tickler
10. Carburetor
11. Cock lever
12. Spark plug

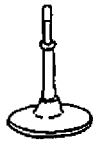
Attachments



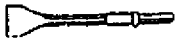
Moil point (drilling)



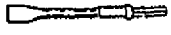
Shovel (digging)



Damper

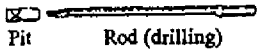


Cutter (cutting)



Chisel (digging)

Breakage



Pit Rod (drilling)

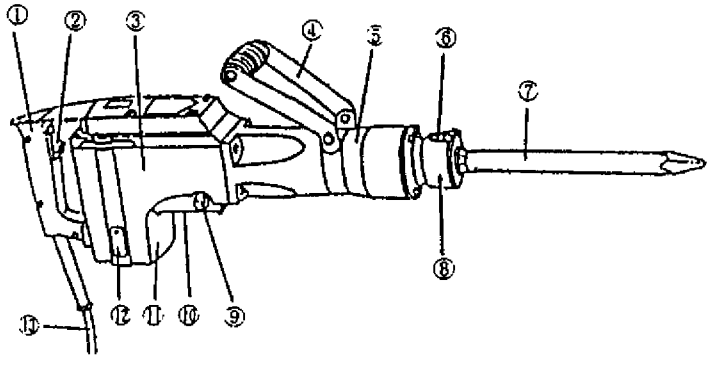
B. Specifications

Engine	Air-cooled 2-cycle single cylinder
Exhaust	292cc
Rotation speed	2,500~3,200 rpm
Fuel mixture	12:1 (oil for 2-cycle engine)
Fuel consumption	2.5 ℓ /hour
Starting method	Manual (automatic rope wind-up)
Fuel tank capacity	1.7 ℓ
Weight	25kg (main unit), 15kg (full attachment set)
Drilling speed	50cm/min
Drilling depth	Approx. 50cm

7-2 Electric rock drill

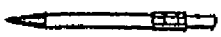
An electric rock drill can be operated with a 100V power source for home electric appliances. This rock drill is used to break concrete structure, rock or bricks by knocking them with a tool mounted to discharge smoke and/or rescue people.

A. Name of each part

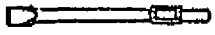


1 Handle
2 Switch
3 Cluck case
4 Grip
5 Barrel
6 Tool retailer
7 Pull point
8 Front cap
9 Oil feed button
10 Oil gauge
11 Motor case
12 Carbon brush
13 Cabtire cord

Attachments



Pull-point (for drilling and breaking)



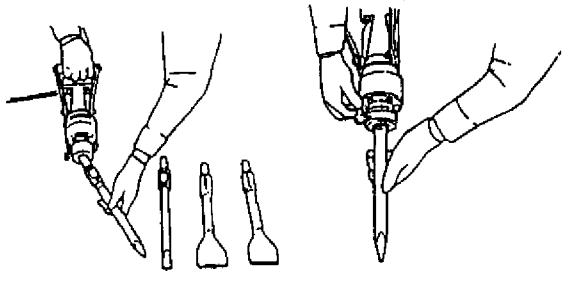
Cold chisel (for channel cutting, corner cutting and general cutting)

Scaling chisel (including one with channel)

B. Specification

Motor	DC rectifier motor	Knocking cycle	1400/min
Voltage	Single-phase 100V	Length of main unit	600mm
Current	100A	Weight	15kg
Frequency	50~60Hz	Cord length	5m
Power consumption	900W		

C. Assembly: rock drill (by 2 persons)

	Person #1	Person #2
1	Take the main unit and attachment, which is suitable for the drilled target, out of the storage box and mount the attachment to the main unit. "Attachment connection OK" 	Plug the power cable to the electric outlet. " Power cable connection OK"

	Person #1	Person #2
2	"OK" Bring the hammer to the drilling site, make sure that the power switch is turned OFF. Give the power plug to person #2. After the sign of "Attachment connection OK", person #2 turns on the power switch and be ready for drilling. "Drilling ready"	Bring the rock drill to the drilling site, receive the power plug from person #1 and insert it into the power outlet of the cord reel. "Power plug connection OK"
3	"Starting" Turn on the switch of the electric rock drill and start drilling. 	Assist person #1 to ease his drilling work while paying attention to make sure that the power plug is securely inserted into the power outlet.

Precautions for drilling work

(1) There should be no access of people to the drilling area.
(2) Use the weight of the rock drill and do not apply any external force.
(3) Use the rock drill at an angle of 45～60 degrees in respect to the target.
(4) If the drill attachment is caught by the target rock, etc., pull it back straight toward you without stopping the drill. Do not try to bend the drill.

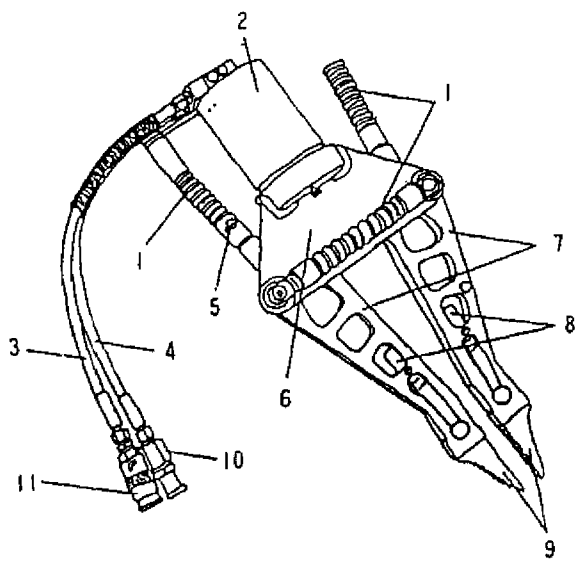
8. Large-size rescue tools

Hydraulic pressure, which is generated with a hydraulic pump called a power unit, is sent to the cylinders of rescue tools such as spreaders, plunger rams and cutters via high pressure hoses. These tools are used to "spread", "cut" or "pushing up" the obstructions at a disaster site.

These rescue tools are separated into hydraulic and pneumatic units according to the power source. The hydraulic units use engine and manual pump, whereas the pneumatic units use air supplied from an air container via the pneumatic hydraulic pressure pump.

A Spreader (made by Company R)

a. Name of each part



1. Handle
2. Hydraulic cylinder equipped with control valve
3. Hydraulic pressure hose (red, for high pressure)
4. Hydraulic pressure hose (blue, for returning)
5. Control pin
6. Cross bar with handle
7. Spreader arm
8. Spring bolt for chip replacement
9. Chip
10. Snap coupling nipple
11. Snap coupling sleeve

b. Specifications

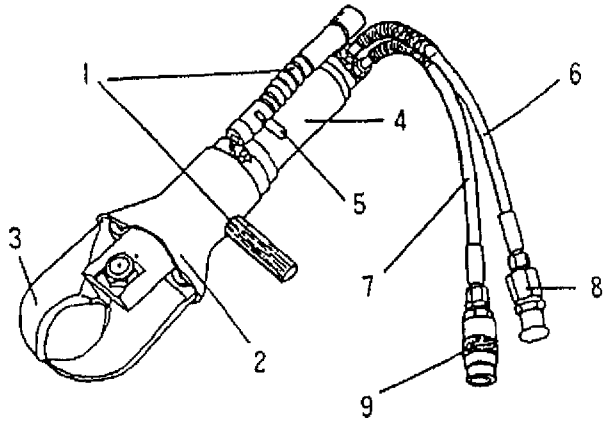
Dimensions	690 x 288 x 178mm
Weight	23kg (including hose and oil)
Max. spreading width	620mm (at the forward end of chip)
Open/close time	Open: 8.5 sec. (discharge amount 2.5 ℓ /min.) Close: 7.5 sec. (discharge amount 2.5 ℓ /min.)
Max. expansion force	4.4t at front edge of chip 5.0t at front edge of arm
Max. pulling & closing force	Closing force 3.9t Pulling force at the intermediate portion of arm 7.3t
Operating pressure	Approx. 63 MPa

* Specifications of a spreader made by Company H

Dimensions	915(L) mm x 304(W) mm
Weight	19kg
Max. spreading width	835mm
Open/close time	Open: 30 sec., Close: 21 sec.
Max. spreading force	6.0t
Max. closing force	6.0t
Operating pressure	72 MPa

B. Cutter (made by Company R)

a. Name of each part



1. Handle
2. Protective hose
3. Blade
4. Hydraulic cylinder
5. Control pin
6. Hydraulic hose (blue, for returning)
7. Hydraulic hose (red, for high pressure)
8. Snap coupling nipple
9. Snap coupling sleeve

b. Specifications

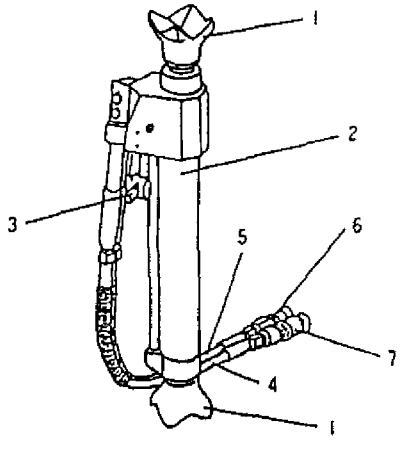
Dimensions	568 x 210 x 180mm
Weight	12kg (including hose and oil)
Max. spreading width	100mm (at the blade edge)
Open/close time	Open: 4 sec. (discharge amount 2.7 ℓ /min.) Close: 4.5 sec. (discharge amount 2.7 ℓ /min.)
Max. cutting force	Blade edge 5.0t Blade center 9.5t

* Specifications of a spreader made by Company H

Dimensions	915(L)mm x 205(W)mm
Weight	14kg
Max. spreading width	100mm (at the blade edge)
Open/close time	Open: 4 sec., Close: 9 sec.
Max. cutting force	Center: 9.0t, Back: 17t

C. Plunger ram (made by Company R)

a. Name of each part



1. Claw
2. Hydraulic cylinder
3. Control pin
4. Hydraulic hose (red, for high pressure)
5. Hydraulic hose (blue, for returning)
6. Snap coupling nipple
7. Snap coupling sleeve

b. Specifications

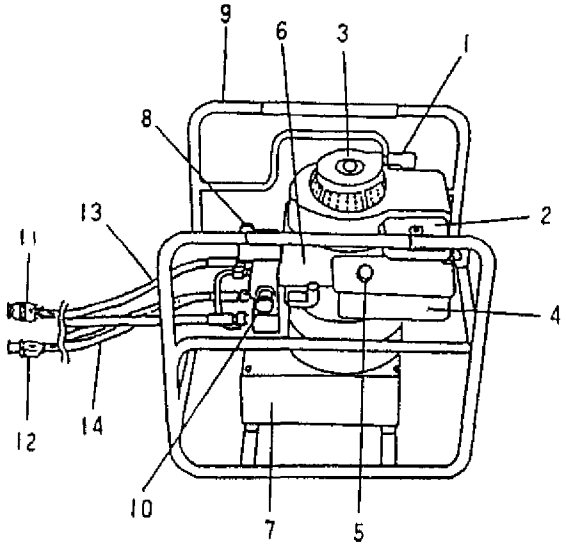
Dimensions	579 x 160 x 70mm
Weight	9kg (including hose and oil)
Max. spreading width	579~1,379mm
Open time	23 sec.
Close time	13sec.
Max. spreading force	8.0t

* Specifications of a spreader made by Company H

Dimensions	715 x 390 x 102 mm
Weight	14.2 kg
Max. spreading width	715 x 1,215mm
Open time	
Close time	
Max. cutting force	16.0t

D. Power unit: Engine type (made by Company R)

a. Name of each part



1. Starter grip
2. Air cleaner
3. Air blower chamber
4. Fuel tank
5. Fuel port
6. Pump
7. Oil tank
8. Oil feed valve
9. Frame
10. Oil feed pipe
11. Snap coupling sleeve
12. Snap coupling nipple
13. Hydraulic hose (blue, for returning)
14. Hydraulic hose (red, for high pressure)

b. Specifications

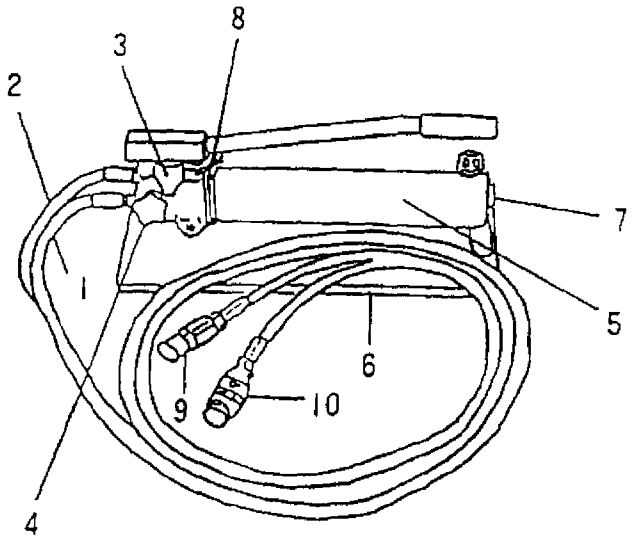
Dimensions		568 x 500 x 590mm	
Weight		44 kg	
Pump	Operating pressure	Low pressure range	0～16 MPa
		High pressure range	16～63 MPa
	Discharge amount	At low pressure	2.7 ι /min.
		At high pressure	0.89 ι /min.
	Switching pressure (LP～HP)		18.5 MPa
	Automatic oil temp. range		-30～+85℃
	Open/close temp.		-30～+70℃
	Oil tank capacity		3.7 ι
	Minimum oil amount required		2.0 ι
Engine	Type		4-cycle gasoline engine
	Rotation speed		3,600rpm
	Exhaust		147.8cc
	Output		3.5 H.P

* Specifications of a power unit made by Company H

Dimensions	455 x 315 x 530mm
Weight	30kg
Pressure	720kg
Oil tank capacity	4.0 ι
Engine type	4-cycle gasoline engine
Rotation speed	3,600rpm
Exhaust	147.8cc
Output	3.5 H.P

E Manual pump (made by Company R)

a. Name of each part



1. Hydraulic hose (blue, for returning)
2. Hydraulic hose (red, for high pressure)
3. 2-step piston pump with pump lever
4. Oil feed valve
5. Oil tank
6. Pump
7. Fuel port
8. Lever set plate
9. Snap coupling nipple
10. Snap coupling sleeve

b. Specifications

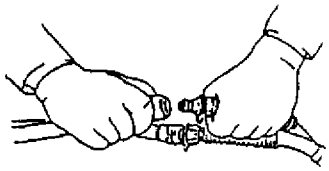
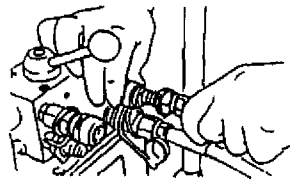
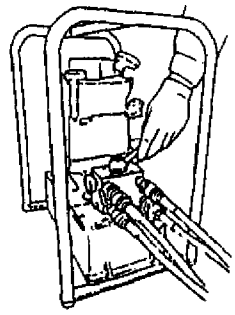
Dimensions		650 x 350 x 180mm
Weight		11kg (including hose and oil)
Operating pressure	Low pressure range	0～18.5 MPa
	High pressure range	18.5～65 MPa
Switching pressure (LP～HP)		4.5 sec., (discharge amount: 2.7 ι /min)
Oil tank capacity		1.3 ι
Minimum oil amount required		1.1 ι
Piston diameter (large)		18 mm
Discharge amount per stroke		4.6 m ι
Piston diameter (small)		10 mm
Discharge amount per stroke		1.4 m ι
Stroke		18 mm

* Specifications of a power unit made by Company H

Dimensions	700 x 240 x 195mm
Weight	10 kg
Pressure	72 MPa
Oil tank capacity	1.6 ι
Performance	21～23cc/stroke

c. Assembly

c-1 Assembly by 3 workers

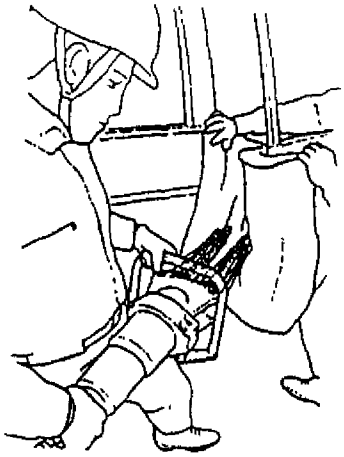
	Worker #1	Worker #2	Worker #3
1	Take necessary tools out of the storage box. Connect the hydraulic hose given by worker #2 to the unit. "** (name of the tool) connection OK" 	Pull the hydraulic hose from the unit and give it to worker #1.	Connect the hydraulic hose to the engine. "Engine connection OK"  Make sure that the oil feed valve is set to "Close". "Oil feed valve OK"
2	Set the tool to the specified position. "Setup OK"	"OK" Assist worker #1 to set up the unit.	Hold the handle of the engine with one hand (left or right hand) and control the throttle lever with the other hand. Hold the starter grip and start the engine after sending a sign "Engine start". Control the engine output to the proper level and send a sign "Engine speed OK".
3	"OK" At the sign of "Oil feed valve open OK" sent by worker #3, start the unit with the control pin.	Assist worker #1 in operating the unit.	Open the oil feed valve and send a sign "Oil feed valve open OK". 

c-2 Putting the unit back by 3 workers

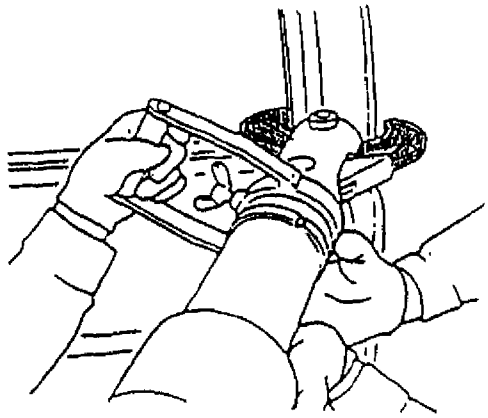
	Worker #1	Worker #2	Worker #3
1	Stop the unit with the control pin and send a sign "OK".		Close the oil feed valve after making sure that worker #1 stopped the unit and send a sign "Oil feed valve closed".
2	Disconnect the hydraulic hose from the unit and give the hose to worker #2. After removing the chip from the unit and store them in the storage box.	Wind up the hose given by worker #1 and put the hydraulic hose on the engine side in order.	Stop the engine and send a sign "Engine stopped". Disconnect the hydraulic hose from the engine. Return the engine and hydraulic hose to the storage site.

[Example of rescue tool utilization]

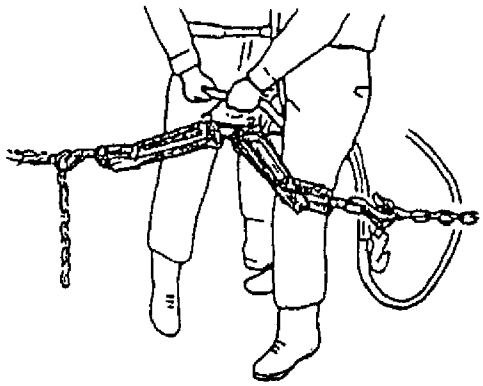
1. Opening by a spreader



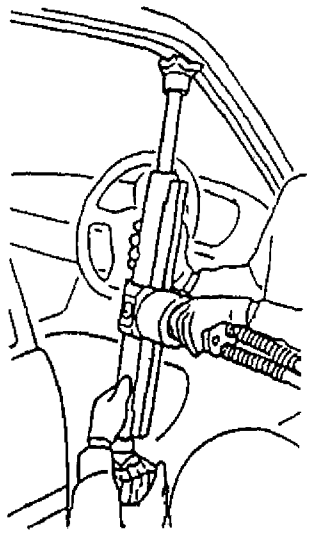
2. Cutting by a cutter



3. Pulling by a spreader and chain



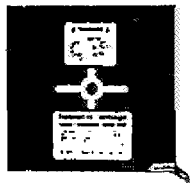
4. Opening by a plunger ram



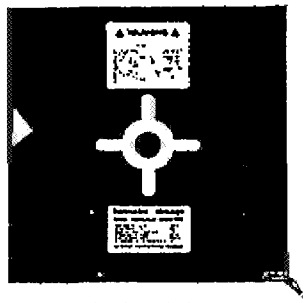
9. Mat-type air jack

A mat-type air jack consists of an air container, pressure regulator, hose. control box and main unit (bag or mat). This pneumatic jack is used to remove heavy materials or to open a deformed door.

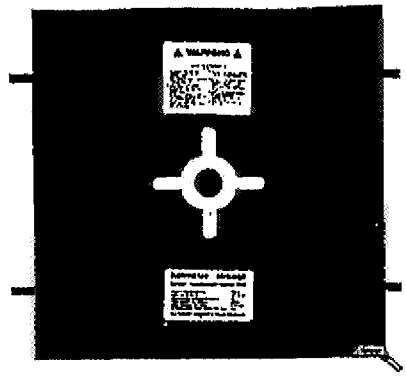
A. Name of each part (made by Company H)



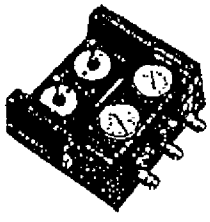
Main unit (11t)



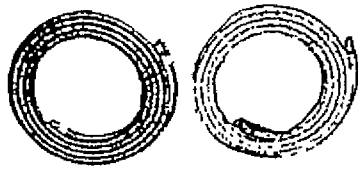
Main unit (29t)



Main unit (40t)

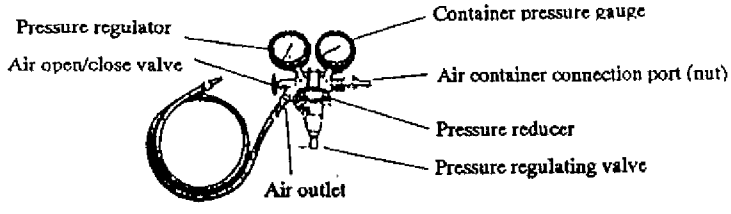


Control box

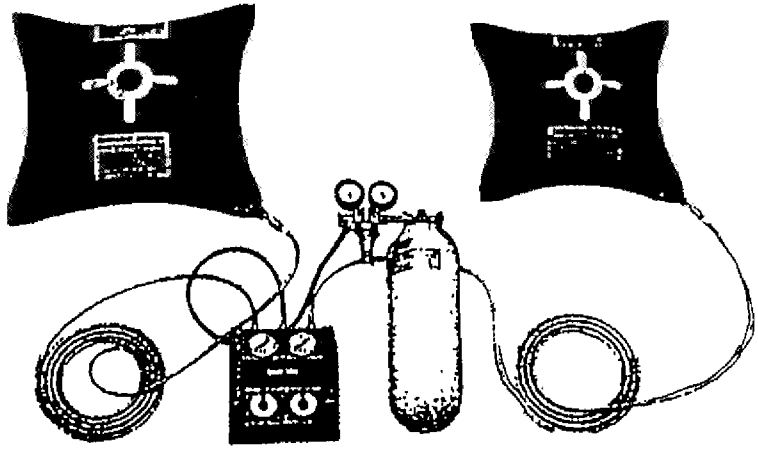


Air hose

Stretching belt



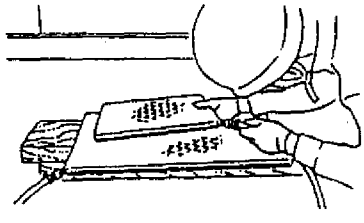
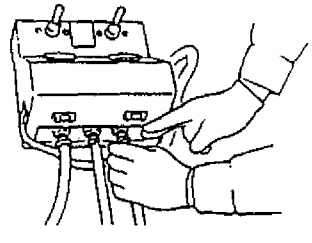
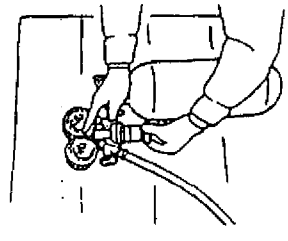
Pneumatic pressure regulator



B Specifications

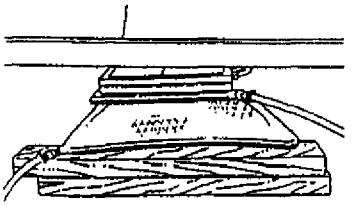
Type		Max. lifting weigh (t)	Max. lifting distance (mm)	Air amount (ι)	Operating pressure (MPa)	Weight (kg)	Dimensions (mm)	Thickness (mm)
11t typp	(Maker H)	11.0	208	84	1.0	5.4	381 x 381	20
	(Maker P)	10.8	200	85	0.8	3.8	381 x 381	20
	(Maker F)	12.0	200	95	0.8	5.5	320 x 520	25
29t typp	(Maker H)	29.0	333	390	0.8	12.7	611 x 611	20
	(Maker P)	28.9	325	390	0.8	9.6	609 x 609	20
	(Maker F)	31.4	370	511	0.8	17.0	650 x 690	25
40t typp	(Maker H)	40.0	395	613	0.8	17.0	714 x 714	24
	(Maker P)	39.7	400	613	0.8	13.5	711 x 711	20
	(Maker F)	39.6	402	675	0.8	19.8	780 x 690	25

C. Assembly by 3 workers

Worker #1	Worker #2	Worker #3
Take the air hose for the mat out of the storage box, connect it to the mat and send a sign "Mat connected". Give the other end of the hose to worker #2. 	Take the controller out of the storage box, connect the air hose given by worker #1 to the air outlet of the controller and send a sign "Controller connected". Make sure that the air feed unit of the controller is in OFF status, connect the air hose given by worker #3 to the air inlet and send a sign "Controller connected". 	Take the regulator out of the storage box, connect it to the air container and send a sign "Regulator connected". give the connecting end of the air hose to worker #2. 

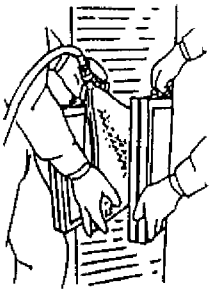
[Examples of back (matte) setup]

Lifting heavy objects



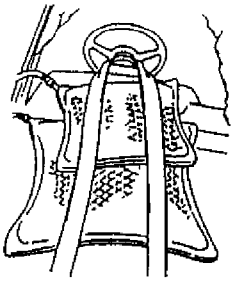
Observe the function and condition of mat.

Opening gaps



Inflate the mat gradually by operating the controller.

Raise wheel shaft

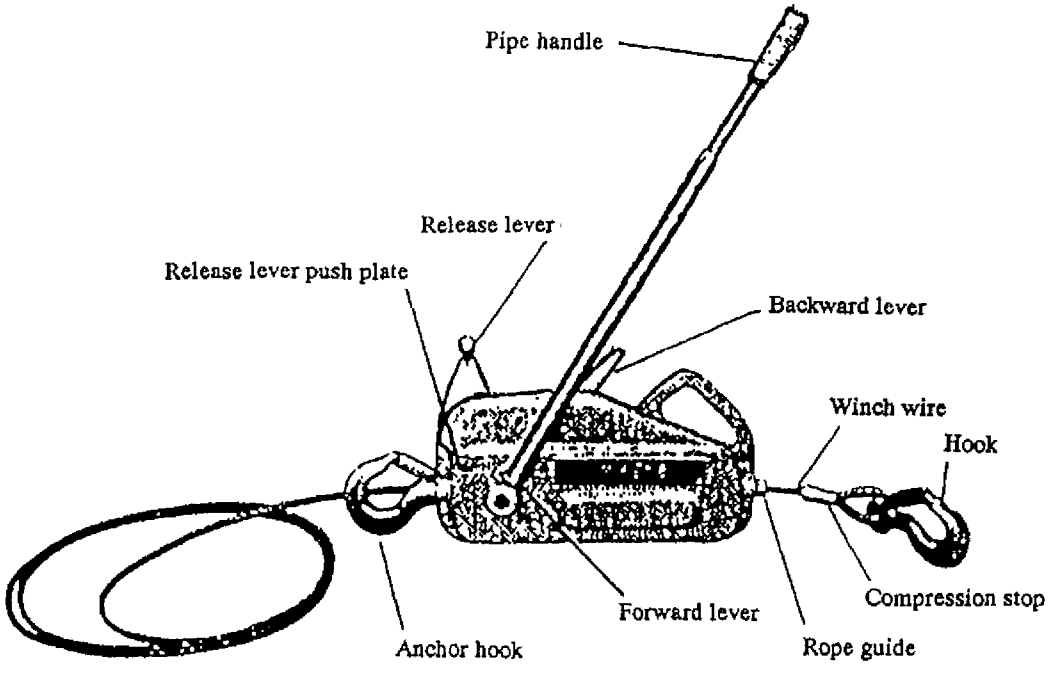


Check the condition of mat while paying attention to the pressure.

10. Portable winch (Tirfor)

A portable winch called "Chill Hole?" is a rescue equipment which is operated manually without using any drive force. A portable winch is most often used for rescue of a victim of traffic accident who is caught in crashed cars. It is also used to remove ordinary obstructions, to move equipment and/or materials, and as a rope bridge.
A portable winch or tirfor is structured to move the wire rope forward or backward by means of 2 pairs of "holding devices" provided at the front and back of the chill hole. The chill hole uses double action by lever and the forward/backward movement can be easily switched simply by changing the position of the pipe handle.

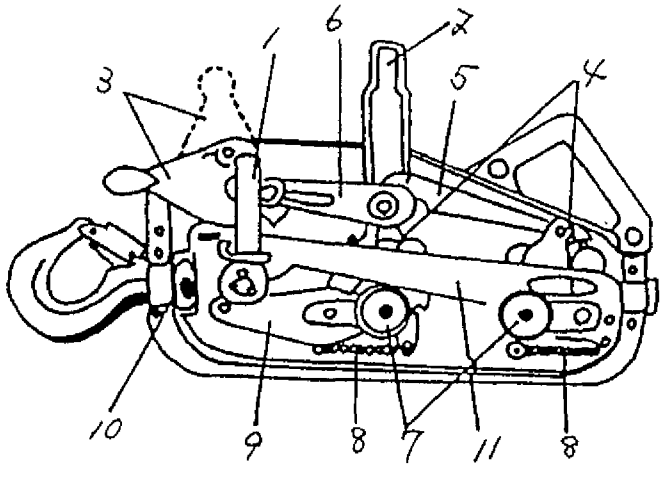
A. Name of each part (made by Company A)



B. Specifications

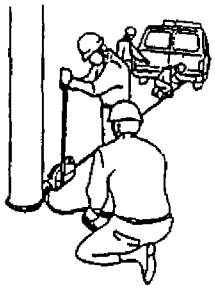
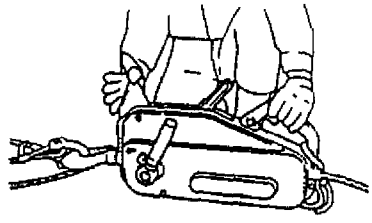
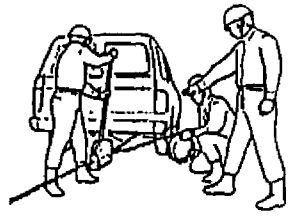
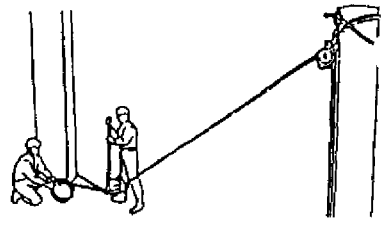
Main unit		Pipe handle			Wire rope	
Capacity	1,600kg (hanging)	Length	Min.	700mm	Length	20m
Lifting distance	No limit (wire length)		Max	1,159mm	Weight	11.3kg (with hook)
Speed	3m/min.	Beam ratio		40:1	Diameter	Max. 11.7mmø
Feed/cycle	70mm (forward/backward movements)				Strength	9.600kg (cutting load)
Safety pin endurance	3,200kg					
Dimensions	644 x 360 x 140mm					
Weight	18kg					

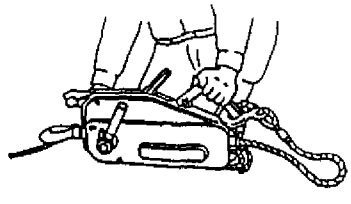
* Internal structure and name of each part



1.	FWD lever
2.	BWD lever
3.	Release lever
4.	Holding device (C1: front, C2: back)
5.	Back link
6.	Release plate
7.	Guide roller
8.	Spring
9.	Front side plate
10.	Anchor hook holding plate
11.	Rear side plate

C. Assembly, operation and storage (by 3 workers)

	Worker #1	Worker #2	Worker #3
1	Cover the target (support) with protective cloth, set the wire sling (hereafter "sling") around the target (support) and send a sign "Sling set". Work together with worker #3 to join the wire hook to the sling and send a sign "Wire hook set". * Example  Secure the support.	Free the release lever so that the wire is pulled and send a sign "Pulling wire OK".  All 3 workers work together to join the anchor hook to the sling. "Anchor hook set" "Start pulling wire" "OK" Allow some margin to the wire, set the release lever, load the pipe to the forward lever and send a sign "Pulling ready"  Secure the target.	Cover the target (support) with protective cloth, set the wire sling (hereafter "sling") around the target (support) and send a sign "Sling set". "OK" Pull the wire hook to the position of worker #1, work together with worker #1 to join the wire hook to the sling, and go back to the original position.  Lift-up, hanging, pulling
2	[Start pulling] Send signs properly to worker #2 while checking the target (support), sling and wire hook. [End of pulling] Stop operating the unit.	"OK" Operate the pipe while shouting "1", "2"---. "OK"	Wind up the wire while checking the conditions of the target (support) and send proper signs to worker #2.

	Worker #1	Worker #2	Worker #3
3	[Storage] Make sure that the wire is loose and send a sign "Wire OK". Disconnect the wire hook from the sling. At the sign of worker #2 "Lever release OK", hold the wire hook and send a sign "Ready".	"OK" Change the pipe to the backward lever and loosen the wire by operating the lever once or twice. At the sign of "Wire OK" from worker #1, remove the pipe from the backward lever and free the release lever. "Lever release OK" Hold the chill hole so that it does not move and send a sign "Chill hole secured".	Put wire in order to ease the winding. At the signs from workers #1 and #2, shout "Start winding".
	At the sign of "Start winding" from worker #3, response "OK".		
	Move to the chill hole at the same speed with the winding speed while preventing the wire from contacting with earth.	Assist worker #3 while securing chill hole.	Wind the wire. After completion of winding, send a sign "Winding over".
4	Shout "OK" in response to the sign "Winding over" from worker #3. Put the wire hook near the chill hole and return the sling and protective cloth to the original storage place.	Receive the wire from worker #3, put it in order, return the wire hook to the handle grip and set the release lever.  Hold the handle grip with one hand and hold the pipe with the other hand. Return all the units and tools to the original storage place.	Give the wire to worker #2, put the protective cloth and sling in order. Hold the wire with one hand and hold the sling and protective cloth with the other hand.

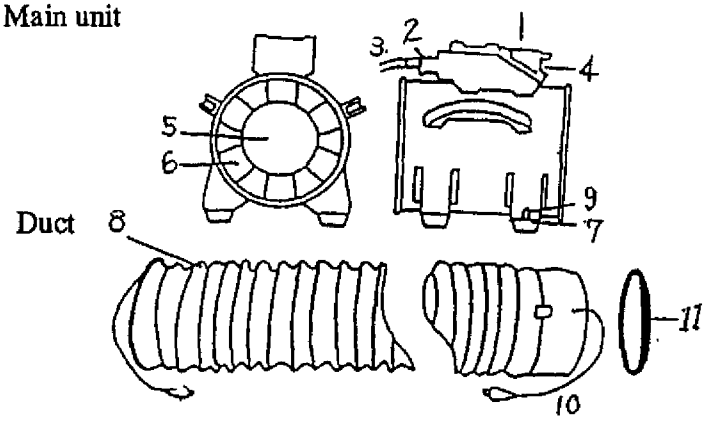
Precautions

1. Operation of pipe handle should not exceed the range where it can be operated with both hands.
2. When hung materials, once lift the material and then set the pipe to the backward lever and operate the unit.

11. Air blower (standard explosion-proof type)

An air blower consists of a main unit and duct. When a lack of oxygen occurs in a basement, storage tank or well, an air blower is used to maintain proper oxygen concentration during rescue activity.
An air blower is also used to remove the dense smoke generated by a fire of heat-insulated building.

A. Name of each part (made by Company A)



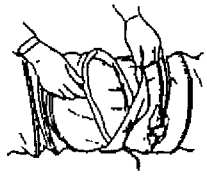
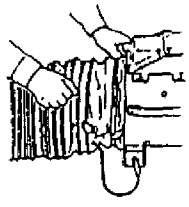
1. Terminal box
2. Cord inlet
3. Cord
4. Switch
5. Pressure-resistant explosion-proof motor
6. Propeller
7. Conductive rubber foot
8. Flexible duct x 2 pcs. (with GND pin and tightening band)
9. GND pin
10. GND grip
11. Tightening band

B. Specifications

Main unit	
Vane diameter	280 mm
Max. air amount	70 m^3/min
Voltage	Single phase 100V
Output	510W
Outer dimensions	370mmL x 3 55mmW x 408mmH
Weight	35 kg
Motor	Induction motor (pressure-resistant and explosion-proof)
Propeller	Wing-type spring made of plastic
Cord	Cabtire cord (explosion-proof) x 8m

Duct	
Flexible duct	With GND terminal
Duct connection	One-touch tightening band
Diameter of tightening band	292mm
Dimensions (diameter and length)	300mm dia. x 5m
Weight	5 kg
Material	Vinylon TARPOLINE 0.45mm

C. Assembly and storage (by 2 persons)

	Person #1	Person #2
1	Connect the duct and send a sign "Duct connected". Connect the duct and blower port and send a sign "Blower connected".  	Connect the power plug of the cord reel to the power outlet and send a sign "Cord reel connected". Make sure that the blower switch is in OFF position, insert the power plug of the blower to the power outlet of the cord reel and send a sign "Power plug connected". Assist worker #1.
2	"OK" Pull the forward end of the duct to the blower, fix it and send a sign "Duct OK".	Help worker #1 to pull the forward end of the duct so that the duct is not dragged on the ground. Return to the original position and wait.
3	Observe the conditions of duct and the forward end of the duct.	"OK" Turn on the blower switch and send a sign "Blower start". "OK" Turn off the blower switch and send a sign "Blower OFF".
4	"OK" Disconnect the duct and return the blower to the storage place.	Disconnect the power plugs and help worker #1. Bring the duct and cord reel to the storage place.

[Example of duct setup]