

Detector Design

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1. Scope of application

This method shall specify the types of vehicle type detection system and the direction for use of the detection.

2. Vehicle type detection

Check the vehicles with different vehicle shape, specification, standard and etc. according to the production plan (Order) in regular production order.

2.1 Receiving detection signal

Get 1 information from 1 detector if possible. For example, use 2 detectors, one to detect the existence and the other to detect the nonexistence, to detect the hole.

Reason for this is to notice the breakdown of the detector easily.

2.2 Shape of parts used for detection

In principle, use the parts existence and nonexistence and the difference in the shape.

(1) Hole (Circle, long hole)

(2) Dimension tolerance (Shape of Dowl, Crip, Nut, Work)

2.3 Diameter and dimension tolerance for the hole used for detection

(1) Hole diameter and set-up graph for detector

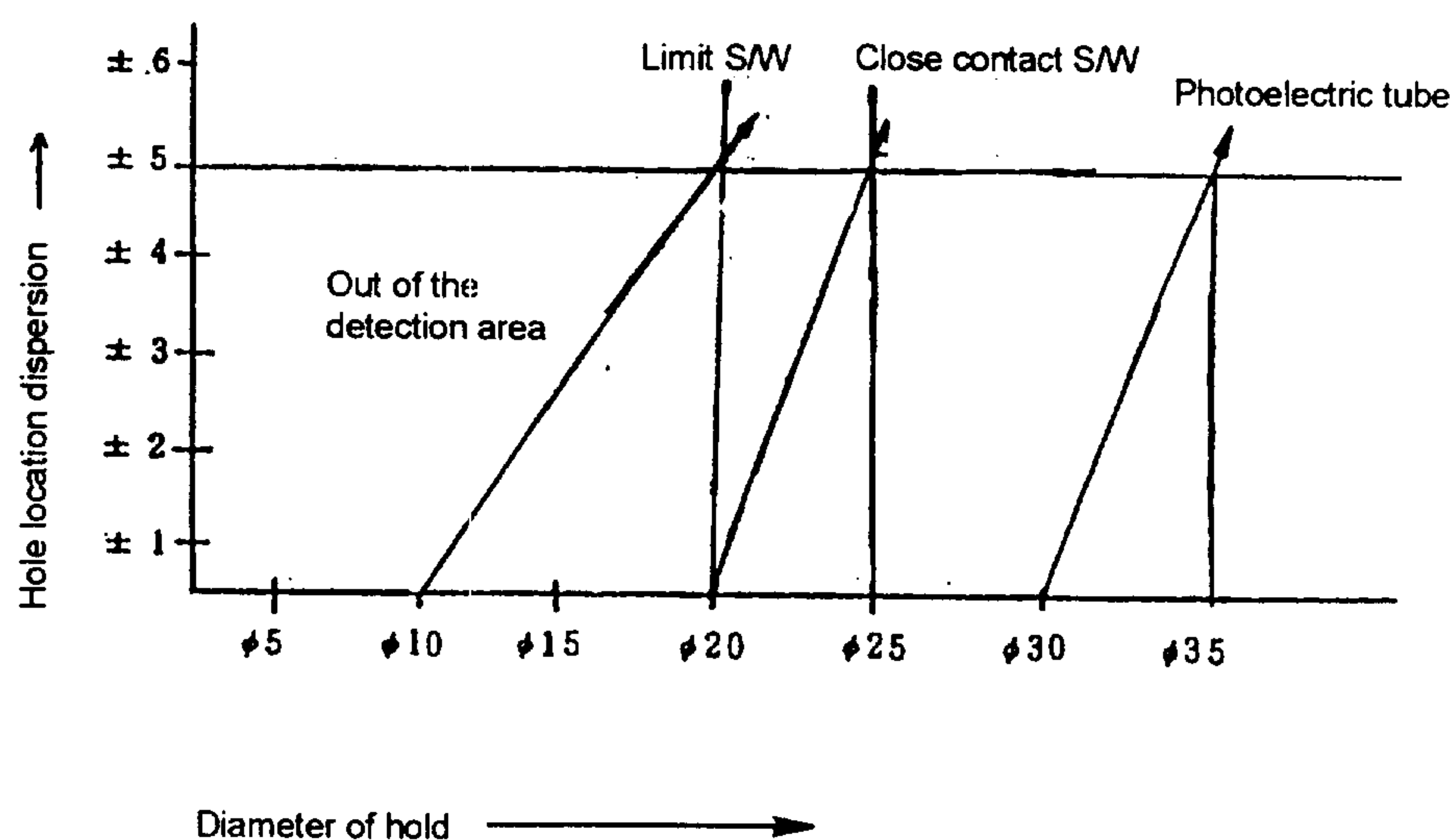


Figure 1.

(2) Dimension tolerance and set-up graph for detector

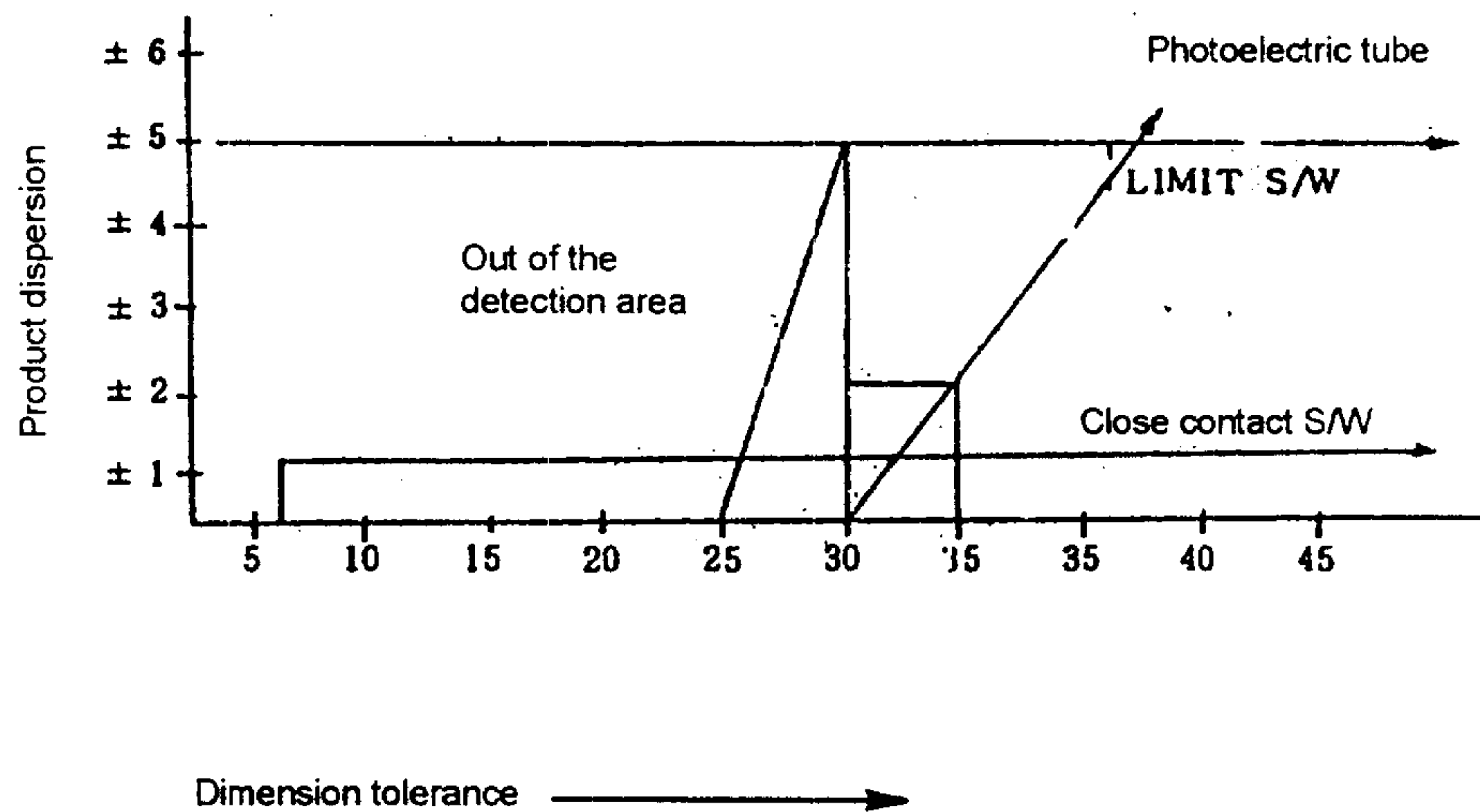


Figure 2.

2.4 Detection types and suggestions for use

2.4.1 Close contact switch

- (1) Try to avoid a magnetic field.
- (2) Do not directly contact the product.
- (3) Consider mounting the preventive cover.
- (4) Pay attention to the dispersion and make the clamp if necessary.
- (5) Prevent the welding spatter.
- (6) Do not use nut to mount the close contact switch.

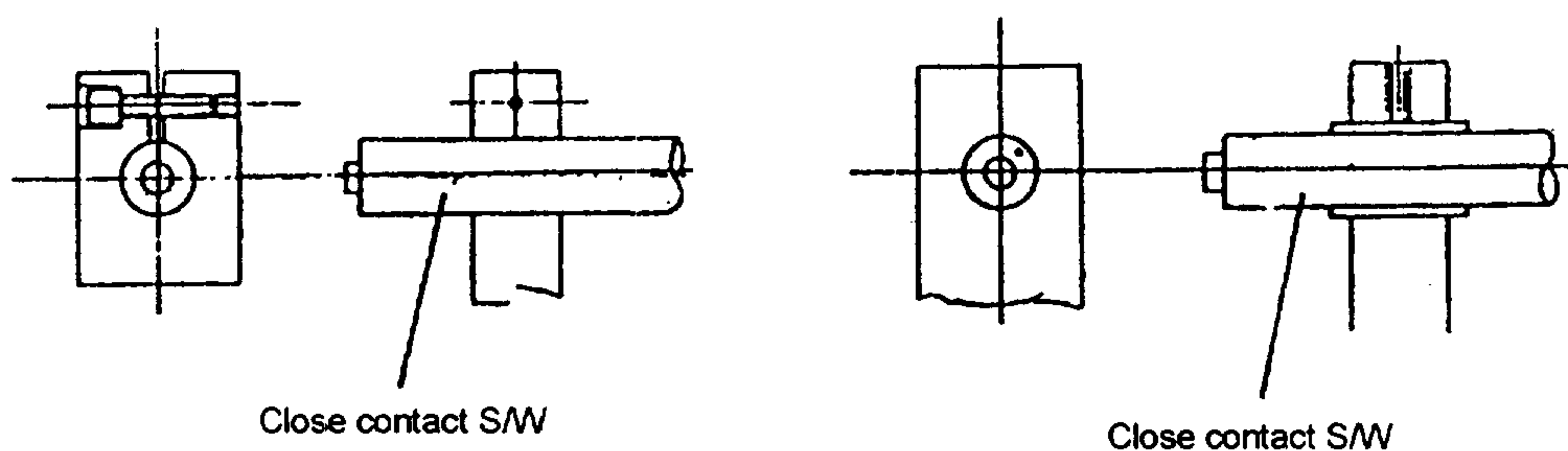


Figure 3.

- (7) Make it easy to exchange and maintain.

2.4.2 Limit switch

- (1) Do not mount to be off when limit switch and dog touch each other.
- (2) Make it easy to exchange and maintain.
- (3) Operate indirectly as much as possible.

2.4.3 Cylinder switch (Normally, it is not used)

- (1) Do not let it in a magnetic field.
- (2) Do not let it be dislocated from the center of a cylinder
- (3) Do not use the one having a magnet in the piston.
- (4) Make it easy to exchange and maintain.

2.4.4 Photoelectric tube

- (1) Basically use transmission type.
- (2) Prevent the spattering.
- (3) Consider the shaking due to the vibration.

(If possible, set it in the place having no vibration.)

2.5 Other detectors

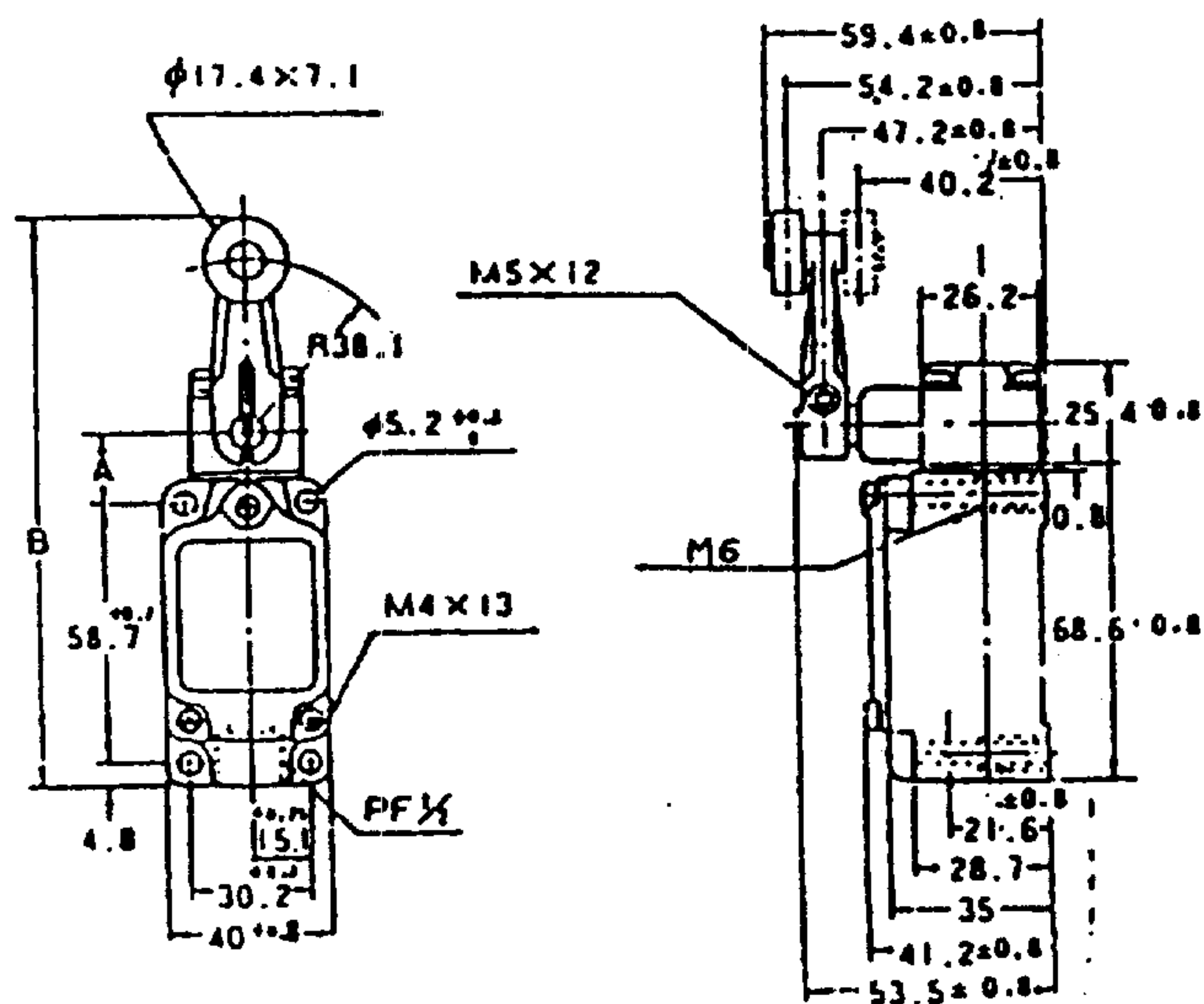
- (1) Micro switch
- (2) Mat switch
- (3) Optical fiber

3. Selection criteria for limit switch

Use 3 types of machine such as the roller lever type (High Over Trouble type, regular lever type) and Bush Seal bond roller plunger type primarily for the sealed type limit switch used for the vehicle assembly manufacturing equipment considering the maintenance, reliability, cost and etc.

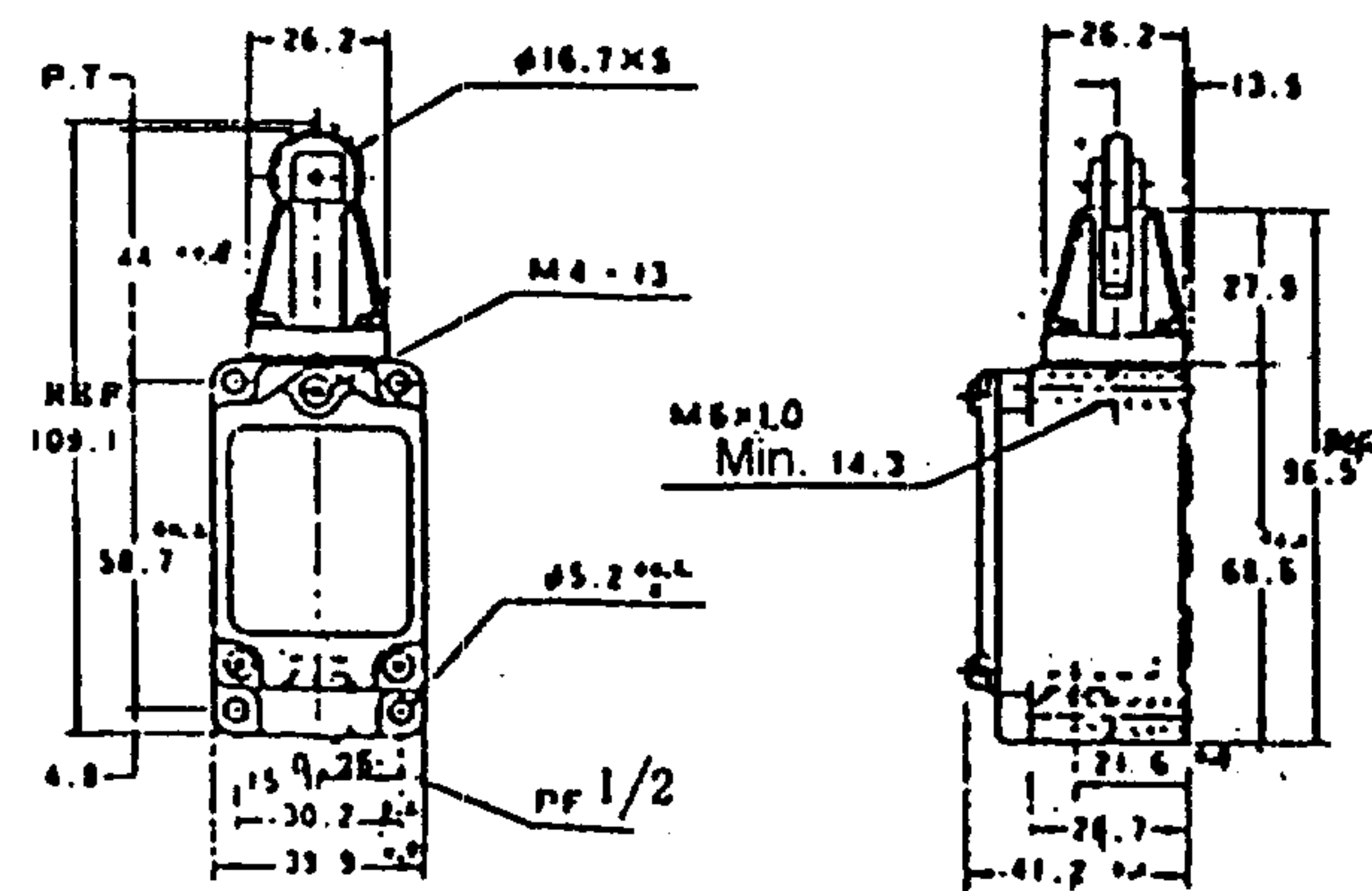
Remarks : Example of lever type application

High Over Trouble type	Used for regular jig, equipment
Regular lever type	Transferring equipment, Apparatus with lifting equipment speed



Roller Lever Type

Figure 4.



Roller Plunger Type

Figure 5.

4. Directions for use of limit switch

Note the following facts in the use of limit switch.

- (1) Do not connect the load to both sides.

(2) Do not connect the power source having different polarity to 1 switch.

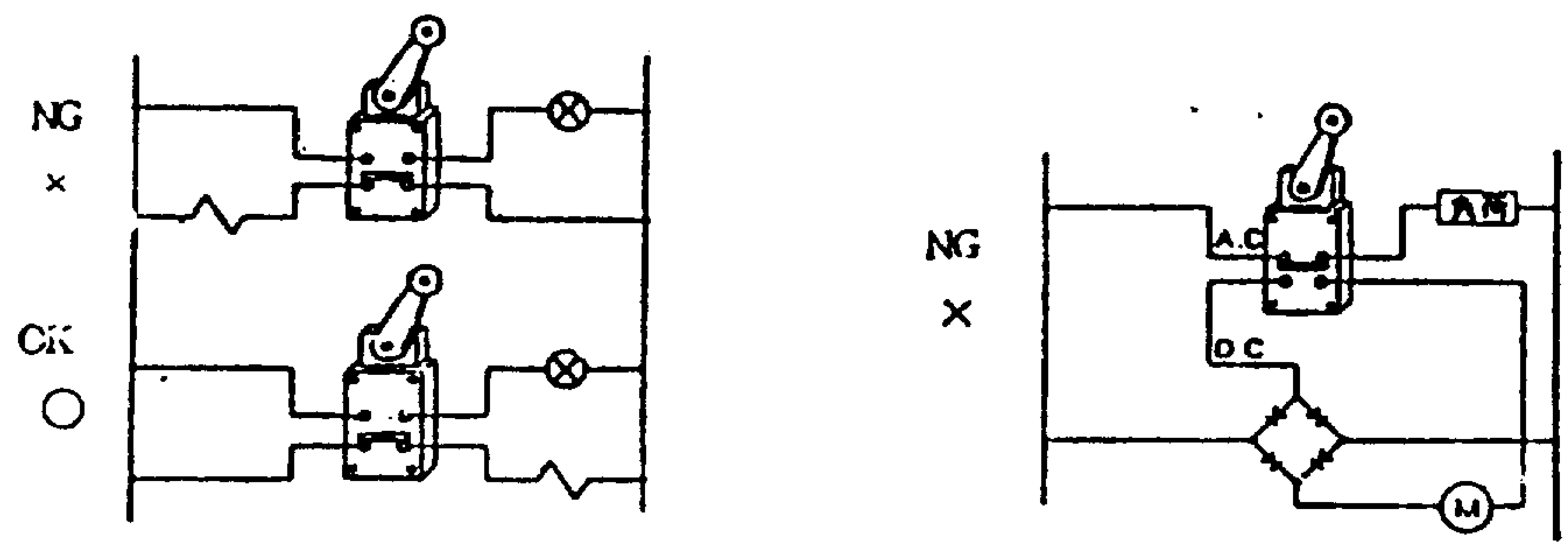


Figure 6.

- (3) For lever type, mount the actuator that moves with the same direction of lever movement.

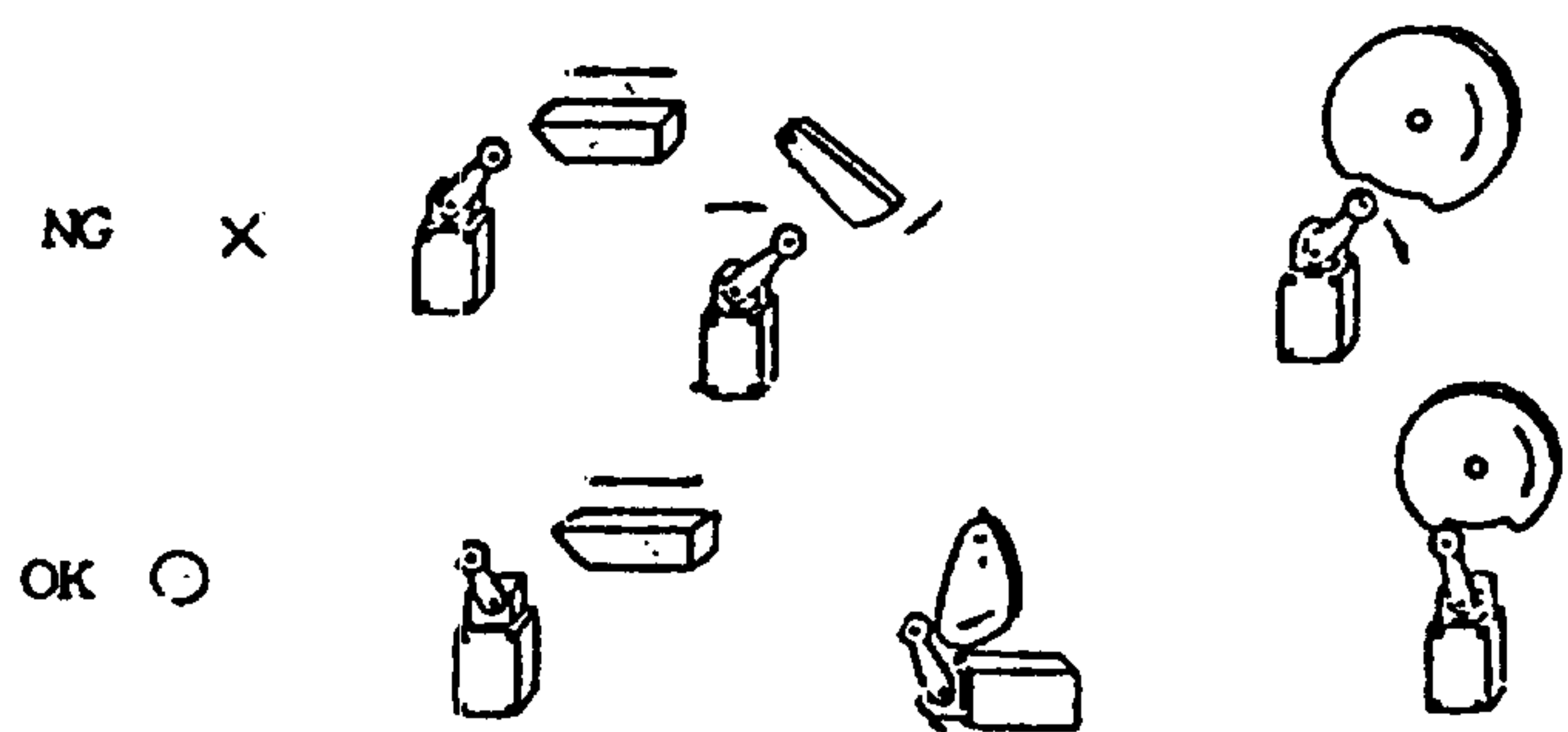


Figure 7.

- (4) For plunger type, design to put the load in the direction of the center line.

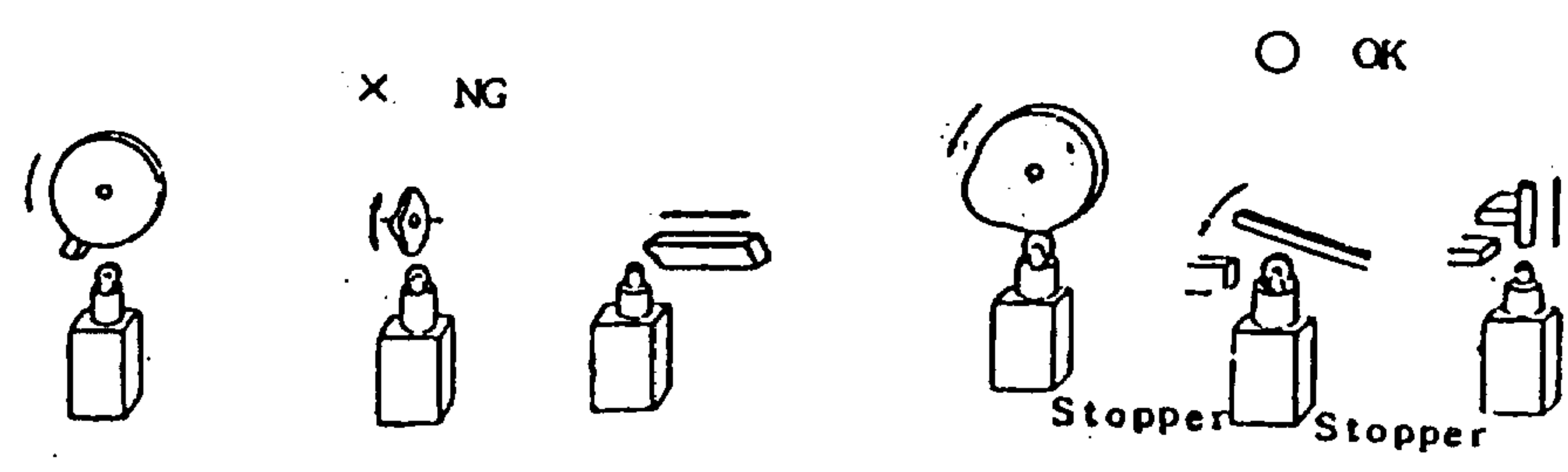


Figure 8.

(5) Mount on the position where the maintenance is easy and the mounting can be secure.

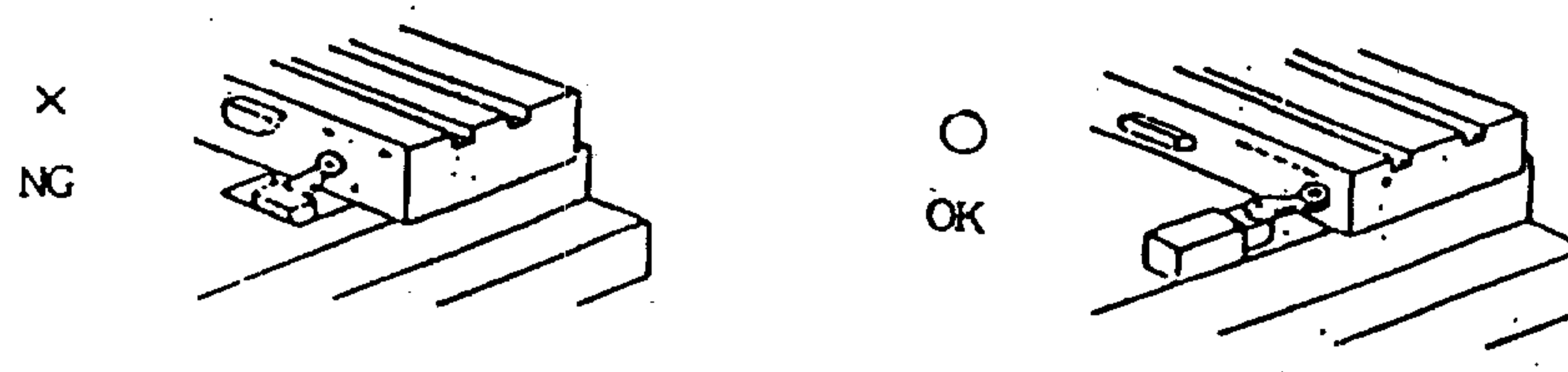


Figure 9.

(6) Mount to operate within the maximum operational limit under any problem. Do not use the sealed type micro switch with a mechanical stopper.

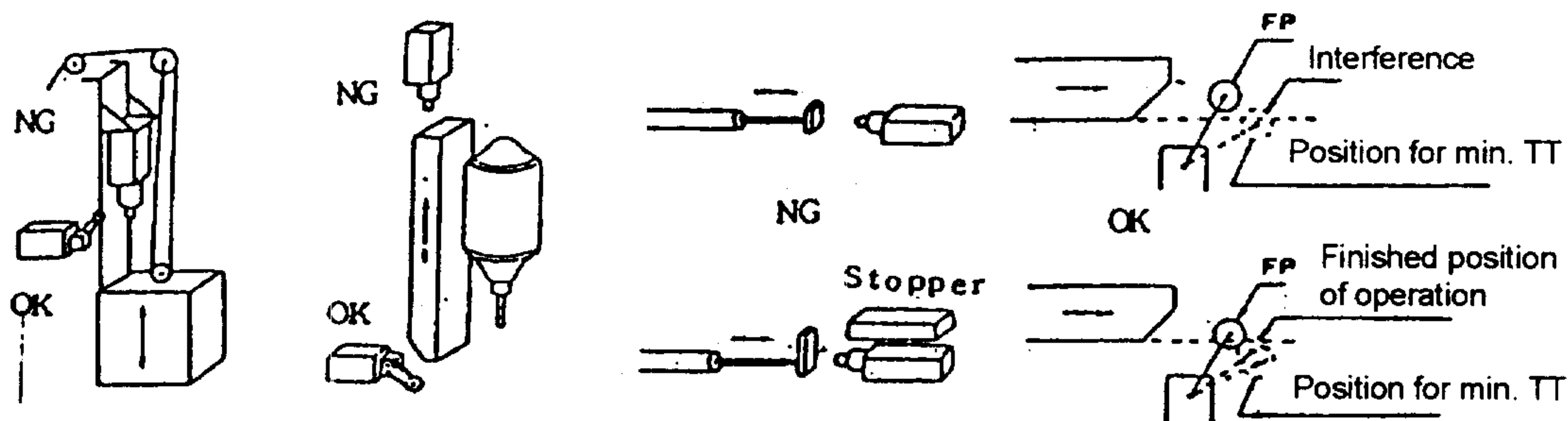


Figure 10.

(7) Design Cam and Dog such that actuator snaps back.

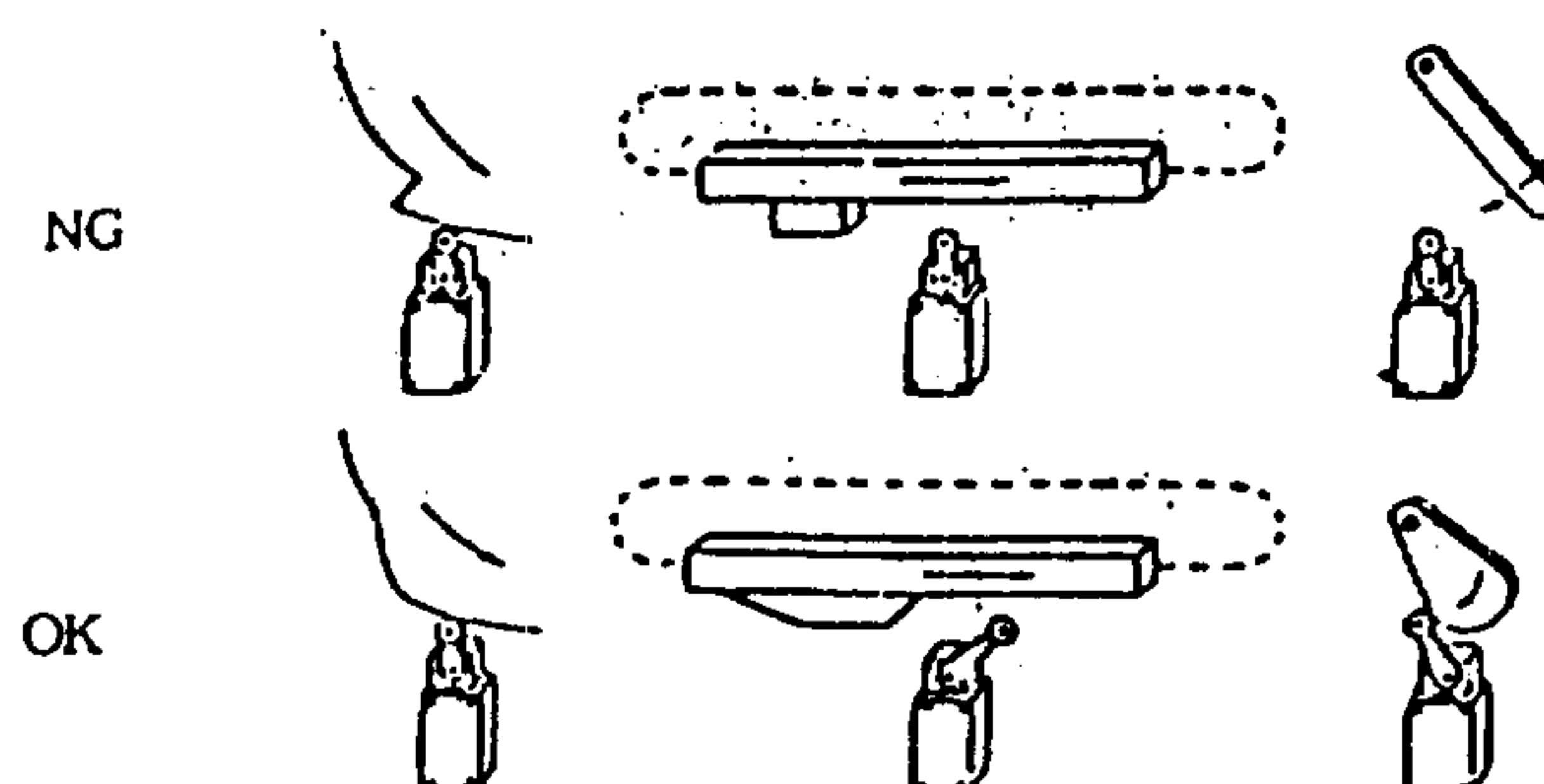


Figure 11.

- (8) Do not use the product having special specification in the place where oil gets into it.

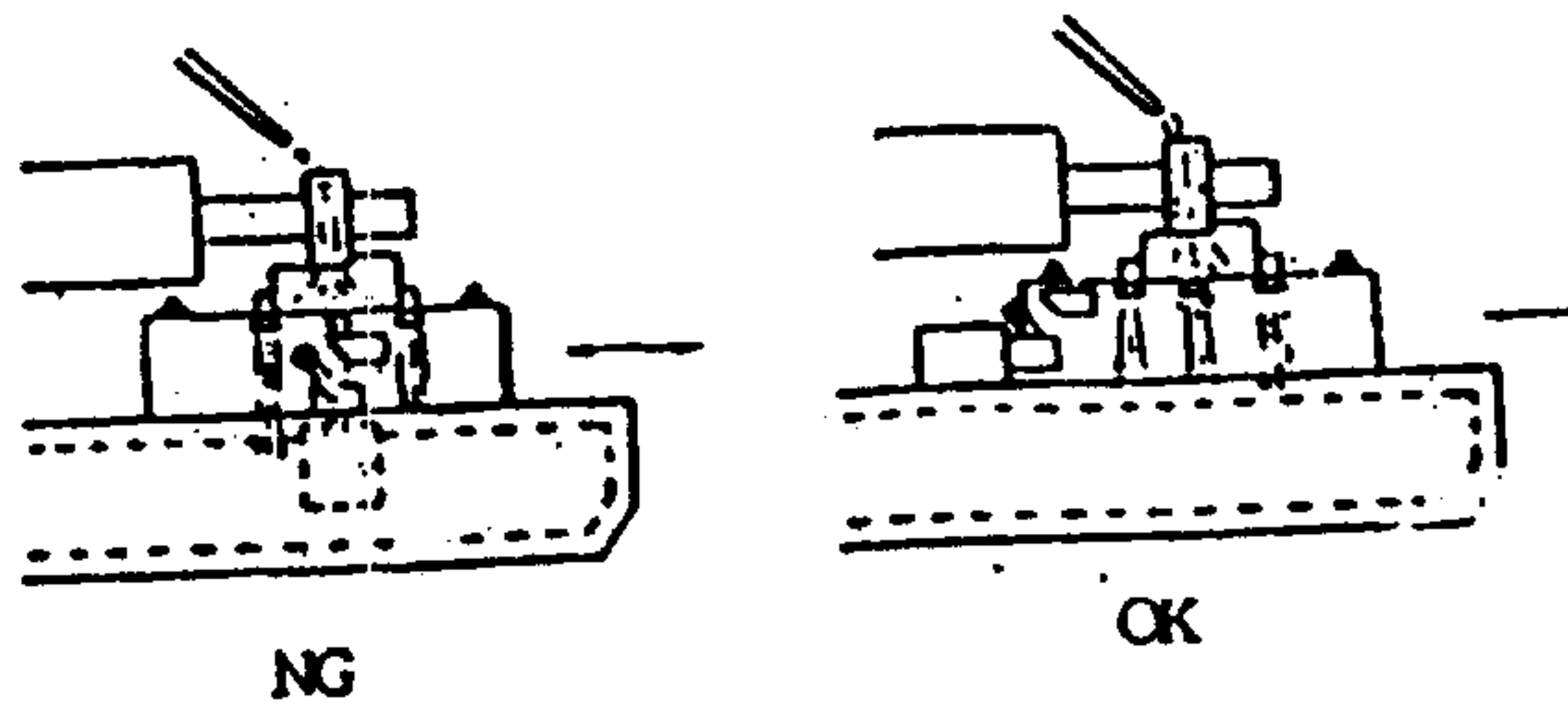


Figure 12.

- (9) Select the mount position to prevent the wrong operation from a worker or equipment operation.

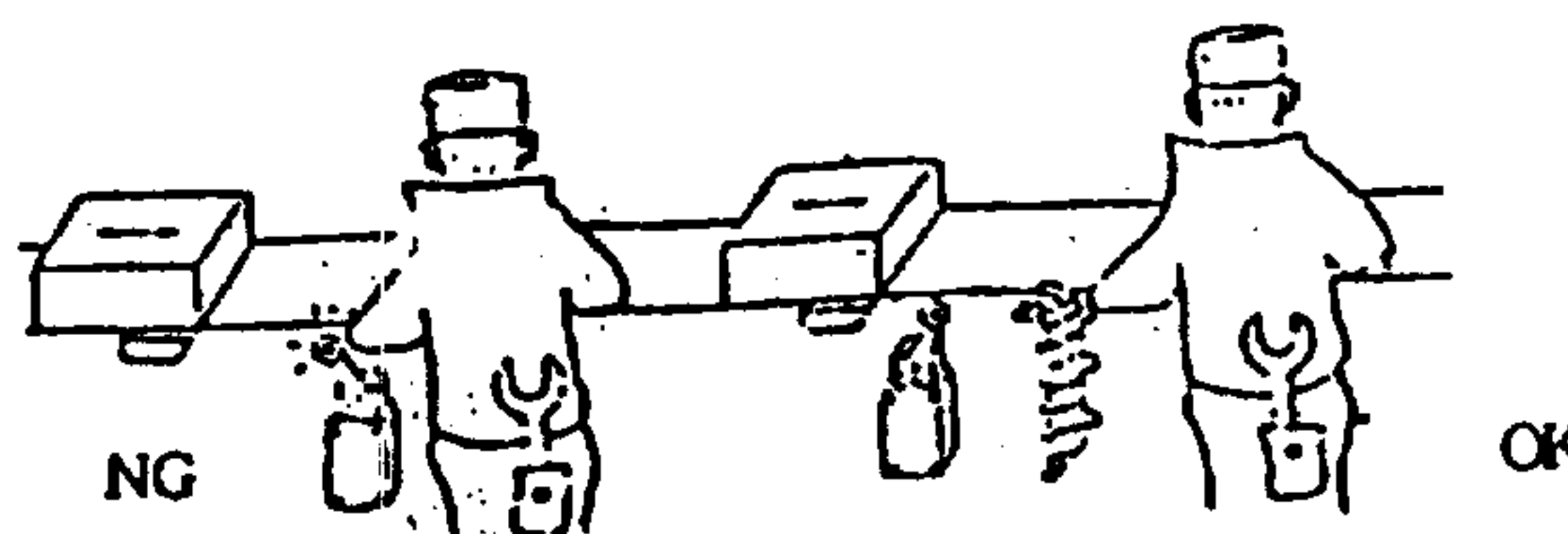


Figure 13.

5. Angle and speed of limit switch dog

5.1 Consider the following facts when designing Dog.

- (1) Set the angle between lever and dog cut plane to be less than 45° . If the angle is over 45° , switch dog may be damaged when the dog speed is fast due to the impact applied to lever shaft.

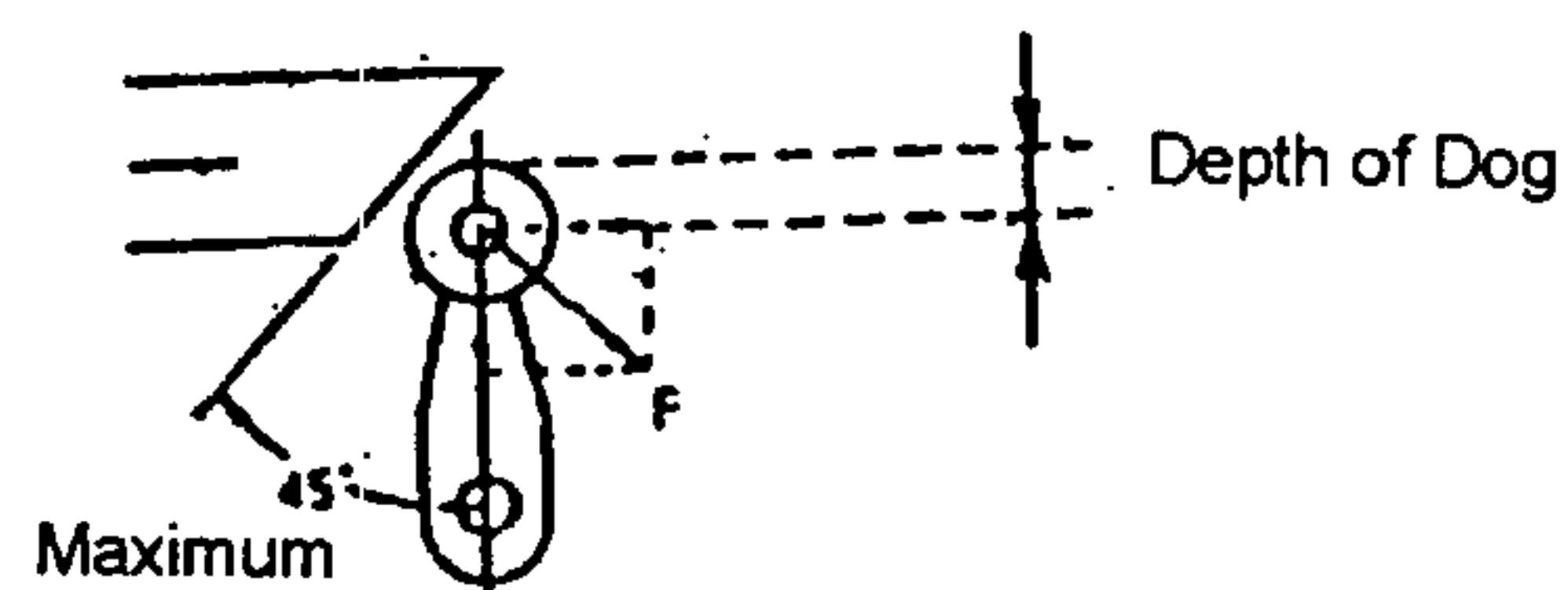


Figure 14.