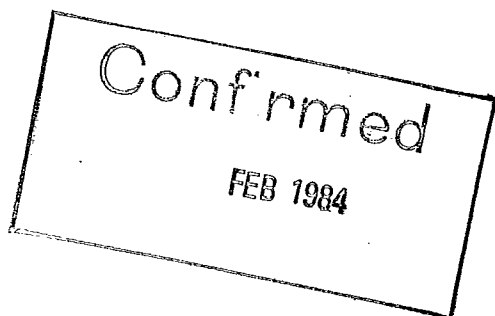


BRITISH STANDARD 3087 : 1959

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PLIERS, PINCERS AND NIPPERS



BRITISH STANDARDS INSTITUTION

BRITISH STANDARD SPECIFICATION

PLIERS, PINCERS AND NIPPERS

B.S. 3087 : 1959

BRITISH STANDARDS INSTITUTION

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THIS BRITISH STANDARD, having been approved by the Mechanical Engineering Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 16th February, 1959.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 3000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook.

This standard makes reference to the following British Standards:

B.S. 350. Conversion factors and tables.

B.S. 1408. Hard drawn steel wire for springs.

B.S. 1429. Annealed steel wire for oil-hardened and tempered springs.

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The following B.S.I. references relate to the work on this standard:
Committee reference MEE/120, MEE/120/1.

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CO-OPERATING ORGANIZATIONS

The Mechanical Engineering Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- *Admiralty
- Air Ministry
- Associated Offices' Technical Committee
- Association of Consulting Engineers (Incorporated)
- British Chemical Plant Manufacturers' Association
- British Compressed Air Society
- British Electrical and Allied Manufacturers' Association
- *British Engineers' Association
- British Gear Manufacturers Association
- British Internal Combustion Engine Manufacturers' Association
- *British Iron and Steel Federation
- *British Railways, The British Transport Commission
- Crown Agents for Oversea Governments and Administrations
- D.S.I.R.—Mechanical Engineering Research Laboratory
- Electricity Council, the Generating Board and the Area Boards in England and Wales
- *Engineering Equipment Users' Association
- Gas Council
- High Commission of India
- Institute of Marine Engineers
- Institute of Petroleum
- Institution of Civil Engineers
- Institution of Gas Engineers
- Institution of Heating and Ventilating Engineers
- *Institution of Mechanical Engineers
- Institution of Mechanical Engineers (Automobile Division)
- *Institution of Production Engineers
- *Locomotive and Allied Manufacturers' Association of Great Britain
- Machine Tool Trades' Association
- Ministry of Labour and National Service
- Ministry of Power
- *Ministry of Supply
- *Ministry of Transport and Civil Aviation
- Ministry of Works
- *National Coal Board
- National Physical Laboratory (D.S.I.R.)
- Radio Industry Council
- War Office

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the Committee entrusted with the preparation of this standard:

- Association of U.K. Plier Manufacturers
- Edge Tool Manufacturers Association
- Engineers and Allied Hand Tool Makers Association
- Federation of British Hand Tool Manufacturers
- Institution of Engineering Inspection
- J.E.S.C. Sub-Committee on Hand Tools
- Light Edge Tool and Allied Trades Association
- London Transport Executive. The British Transport Commission
- National Association of Tool Dealers
- National Union of Furniture Trade Operatives
- Post Office
- Saw Trades Association
- Society of British Aircraft Constructors
- Society of Motor Manufacturers and Traders Ltd.

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BRITISH STANDARD SPECIFICATION FOR PLIERS, PINCERS AND NIPPERS

FOREWORD

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee and forms one of a series relating to a wide variety of hand tools.

The object of the standard is twofold. First, it presents a simplified range of types and sizes which should be suitable for the vast majority of everyday applications and, secondly, it ensures a minimum standard of quality of the tools so that they will have a useful life.

In actual fact there is an extremely wide variation in types, sizes and uses of pliers and related tools. Although the selection of those to be included in this specification was, to some extent, arbitrary, a number of those of which the design or the use was obviously special have been omitted.

The duties required of a pair of pliers are often severe. For instance, there are many fields in which it is necessary for them to be able to cut hard steel wire, soft copper wire and cotton with equal facility and it may therefore, at first sight, appear strange that no clauses in the specification relate to the material from which the tools are made, or to the hardness after heat treatment. The reason for this omission is that many experiments and developments are currently taking place on the material for, and heat-treatment of, these tools and so the quality of the tools is ensured by stringent performance tests.

The preparation of the standard has entailed a great deal of experimental and research work, which has been carried out by members of the U.K. Plier Manufacturers' Association, who have taken into account modern developments in production techniques, principally in relation to heat-treatment methods. The object of the experiments has been to devise the most efficient performance tests consistent with reasonable cost. During the development of the tests, due consideration was given to the tests which appear in such publications as the American Federal Specification for Pliers, and a number of such tests were actually carried out so that comparisons could be made with those being devised for this standard. It is emphasized that the cutting tests incorporated are intended to indicate the maximum shearing and cutting possibilities of the appropriate tools and are not intended to represent the constant general average use.

Care has been exercised to ensure that tools prepared and supplied in accordance with this specification shall be of good quality, while, at the same time, nothing has been included which would tend to interfere with any technical development of the design of the pliers, pincers or nippers, or the material from which they are manufactured. Furthermore, it will be noticed that nominal weights of the tools have been included in the dimensional tables, the reason

being that there is a direct relationship between weight and quality which is an additional safeguard to the user.

The testing equipment illustrated in the specification has been developed by British manufacturers. It is not intended to be costly equipment, and the diagrams shown are intended to indicate the principles on which such tests should be based.

It is necessary to add a warning regarding insulated handles. The specification quotes PVC or any other suitable insulating material which is agreed between the purchaser and manufacturer, but the fact that a tool has insulated handles is not a guarantee that the user is safe from electric shock. When these tools are used on electrical equipment, additional precautions should therefore be taken.

NOTE. Where metric equivalents have been given, the figures in British units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on the tables in B.S. 350, 'Conversion factors and tables'.

SPECIFICATION

SECTION ONE: GENERAL

SCOPE

1. This British Standard specifies requirements for pliers, pincers and nippers which have the types of joint and forms of nose listed below:

a. Joints.

Box	Parallel-action
Lay-on	Slip
Single	Lever assisted

b. Noses.

(i) *Pliers.*

Side cutting with pipe grip	Flat
Side cutting without pipe grip	Flat, fine point
Round	Fencing
Snipe	Slip
Duckbill	Pipe grip, (gas pliers)

(ii) *Nippers.*

End cutting	Diagonal cutting
-------------	------------------

(iii) *Pincers.*

Carpenters (see Fig. 3 under Pincer)

The nominal dimensions, tolerances and weights of the various types are laid down in a series of tables.

The quality and life of the tools is ensured by the twisting, gripping and handle load tests with the addition of cutting tests where these are applicable

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NOMENCLATURE

2. For the purposes of this British Standard the terms used for pliers, pincers and nippers are those shown in Fig. 1.

NOTE. Fig. 1 illustrates a pair of side cutting pliers with pipe grip, but the terms given should be understood to refer also to pincers and nippers by the substitution of the form of head appropriate to the tool.

The types of joint and nose are those shown in Figs. 2, 3 and 4.

SECTION TWO: MANUFACTURE

ACCURACY

3. *a. Jaws.* (i) *Side cutting pliers.* When the tool is closed, any gap at the point of the jaws shall not exceed 0.015 in.

(ii) *All types of plier other than those in (i) above.* When the tool is closed, there shall be no gap at the point of the jaws.

(iii) *Pincers.* The jaws of pincers shall meet along their whole length.

b. Cutting edges. (i) *Side cutting pliers.* The cutting edges shall make contact along the whole of their length subject to a maximum deviation of 0.002 in.

(ii) *Nippers.* The cutting edges of nippers shall make contact along the whole of their length subject to a maximum deviation of 0.002 in.

FINISH

4. *a. General.* *All types.* The tools shall be free from burrs and deleterious defects.

All sharp edges shall be removed from the handles and the open ends of the handles rounded, particularly in the case of insulated tools, before application of the insulating material.

All rivets, hinge pins and joints shall be prepared in such a manner that the joints function smoothly and without shake.

Before assembly, the joints shall be cleared of any remnants of abrasives which might lead to subsequent wear.

All single joints shall be fully and wholly machined.

b. Pliers. Side cutting pliers shall normally be supplied with flared handles, but bowed handles may be supplied by arrangement between the purchaser and the manufacturer.

With the exception of those referred to in the following paragraph pliers shall be supplied with the head polished bright and with a smooth dark oiled finish on the rest of the tool.

Parallel action joints and lever assisted joint pliers shall have a smooth dark oiled finish on the head, and the handles shall be plated.

NOTE. These finishes may be varied by arrangement between the purchaser and the manufacturer.

c. Pincers. Pincers shall normally be supplied with a conventional knob at the end of one handle and a claw on the other, but alternative patterns will be available by arrangement between the purchaser and manufacturer.

Pincers shall have a smooth dark oiled finish and be polished bright on the point.

NOTE. These finishes may be varied by arrangement between the purchaser and the manufacturer.

d. Nippers. The heads of nippers shall be polished bright adjacent to the cutting edge with a smooth dark oiled finish on the rest of the tool.

NOTE. These finishes may be varied by arrangement between the purchaser and the manufacturer.

e. Pipe grips. The teeth of the pipe grip on pliers shall be formed and prepared in such a manner that they function efficiently as a non-slipping grip and are not damaged when used on mild steel.

f. Joint cutters. The joint cutters shall operate with an efficient shearing action.

MARKING

5. The pliers, pincers and nippers shall be marked, legibly and indelibly, with the name or trade-mark of the manufacturer.

INSULATION

6. Pliers having insulated handles will be supplied by arrangement between the purchaser and the manufacturer.

The insulating material shall be PVC or any other suitable material agreed between the purchaser and the manufacturer.

The insulation shall cover the whole of the handles including the outer ends and, particularly on side cutting pliers, may be shouldered at the head end.

The insulating material shall adhere firmly to the handles and shall be of a type which is not easily splintered or damaged.

The test voltage shall *not* be marked on the tool or insulation.

Warning. The fact that the handles of pliers are insulated is no guarantee of immunity from electric shock. Although insulated pliers may have stood high voltages, damage due to subsequent dropping, or the presence of liquid or perspiration, may result in contact with live apparatus. It is therefore recommended that complete reliance should not be placed on insulated handles.

PROTECTIVE TREATMENT

7. To ensure the tools being in good condition upon delivery to the user, all pliers, pincers and nippers shall be subjected to a satisfactory anti-corrosive treatment.

DIMENSIONS, TOLERANCES AND FORMS

8. The range of nominal sizes and weights for each type of tool, together with their dimensions and tolerances, shall be those given in Tables 1 to 20 inclusive. These tables also give the figures for the cutting tests, torsion tests and handle load tests. Included in each table is a sketch indicating the general form of the relevant tool, with alphabetical references to the dimensions.

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SECTION THREE: TESTS

CUTTING TESTS

9. All pliers and nippers which have cutters incorporated shall be capable of passing the cutting tests given below.

The tests shall be manually applied using reasonable hand pressure with no mechanical assistance and shall be carried out half way along the cutting edge, except in the case of end cutters, on which the test shall be made one third of the length from either end. Notwithstanding the cutting positions given above, each tool shall be capable of cutting the appropriate type of wire at any point along its length.

Test A. (i) All types, with the exception of nippers with lever-assisted joints, and parallel action side cutting pliers:

A cutting test shall be made three times at the same point of the cutting edge on steel wire to Specification En.49B in B.S. 1408*, having a tensile strength of 110 tons/sq. in. and a diameter as given in the relevant tables.

The tools shall cut the wire sharply and cleanly, with no deterioration of the cutting edges.

(ii) Nippers with lever-assisted joints, and parallel action side cutting pliers:

A cutting test shall be made three times at the same point of the cutting edge on steel wire to Specification En.49B in B.S. 1408*, having a tensile strength of 130 tons/sq. in. and a diameter as given in the relevant tables.

The tools shall cut the wire sharply and cleanly, with no deterioration of the cutting edges.

Test B. All types. A cutting test shall be made on fully annealed copper wire or annealed mild steel wire, having a diameter of 0.036 in. (20 S.W.G.) in all cases.

The tools shall cut the wire sharply and with no appreciable flat.

Test C. This test is for joint cutters only and shall be made on wire with a tensile strength not greater than 70 tons/sq. in., such as En.42B from B.S. 1429†. The tools shall shear the wire sharply and cleanly, with no deterioration of the cutters.

TORSION TESTS

10. All pliers of the appropriate types shall be capable of passing the torque test given below using apparatus similar to that shown in Fig. 5 where applicable.

The torque, expressed in pound inches (lb in.) shall be derived from the suspended weight, W , multiplied by the radius, R , of the supporting cylinder. See W and R in Fig. 5.

Test details. Each tool tested shall lift the weight appropriate to its type, as shown in the relevant tables, three times in quick succession, when being turned

NOTE. Alternative sizes of hole are shown in Fig. 5 and care should be taken, when carrying out this test, to select the holes most appropriate to the size of plier.

* B.S. 1408, 'Hard drawn steel wire for springs'.

† B.S. 1429, 'Annealed steel wire for oil-hardened and tempered springs'.

in either direction, following which there shall be no distortion of the jaws or loosening of rivets or bolts.

HANDLE LOAD TEST

11. All pliers, pincers and nippers shall be capable of passing the following tests, which ascertain the deflection of the handles under load and the maximum permanent set which the handles take up as a result of such loads.

Test details. The tool shall be mounted in a suitable test apparatus based on the principles illustrated in Fig. 6.

A test load W is applied to the handle at a distance L from the fulcrum of the jaws, as shown in Fig. 6. The product $W \times L$ is expressed in pound inches in the tables.

An initial weight of approximately 5 lb shall be applied and the distance between the outer ends of the handles of the sample under test measured.

The initial load shall then be increased by the test load appropriate to the tool and the resultant deflection shall be measured at the outer ends of the handles.

The test load shall then be removed leaving the initial load in place, and while in this position the permanent set of the handles shall be determined by measuring the difference of the dimension across the outer ends of the handles from that originally measured.

The deflection and the permanent set shall in no case exceed those given in the relevant tables.

SHOCK TESTS

12. All pliers, pincers and nippers shall be capable of withstanding, without sign of injury or deterioration, the test of having the nose struck, with normal manual force, against a mild steel block while being held manually by the handles.

PINCER TESTS

13. All pincers shall be capable of passing the following test:

A 10 S.W.G. round mild steel wire nail shall be gripped between the working edges and the head of the pincer then struck with normal manual force against a mild steel block, after which the jaws shall show no sign of injury or deterioration.

INSULATION TESTS

14. Pliers and nippers having insulated handles shall be capable of passing the following test to ascertain the quality of insulation:

The insulated handles shall be immersed in a conducting fluid, such as a solution of soda in water.

This immersion shall be up to a distance from the end of the insulant sufficient to obviate any arcing between the solution and the head of the tool.

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The solution shall form one pole of an electrical circuit, the opposite pole being formed by the jaws of the tool.

The insulation shall then withstand a pressure of 2800 volts (r.m.s.) a.c. with a frequency ranging between 25 and 100 cycles per second. Alternatively a pressure of 4000 volts d.c. may be used.

The pressure shall be maintained continuously for two minutes, during which time there shall be no breakdown of the insulation.

NOTE. See Note in the Foreword relating to the safety of insulated handles.

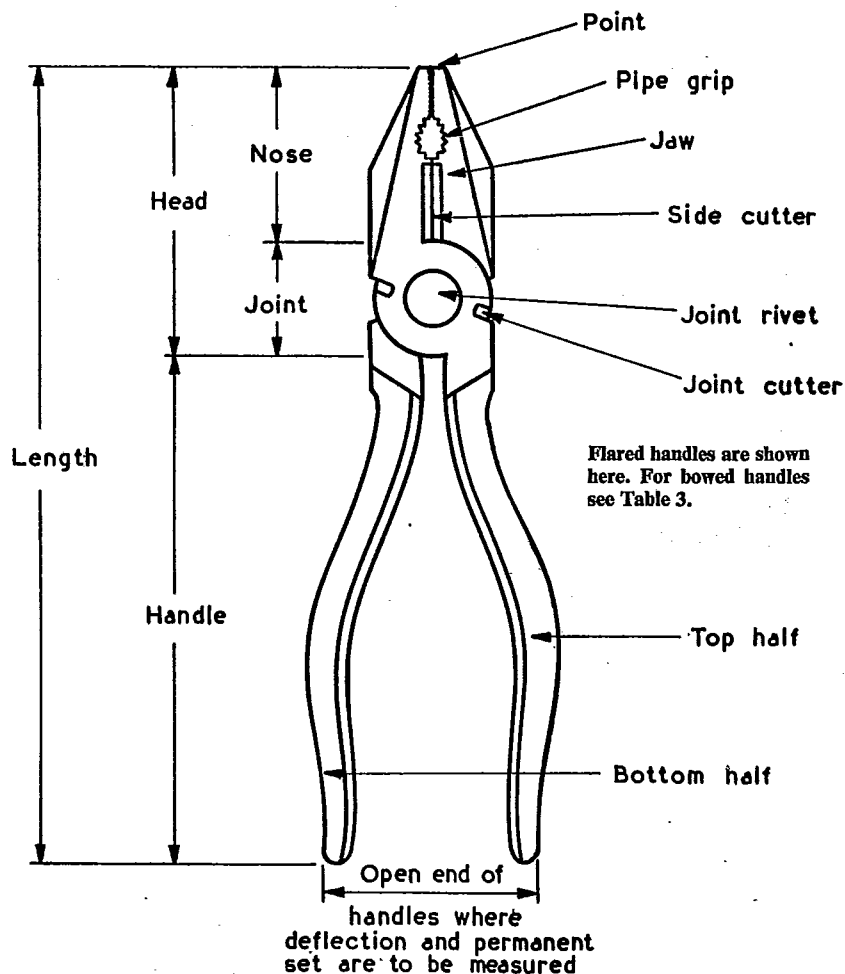
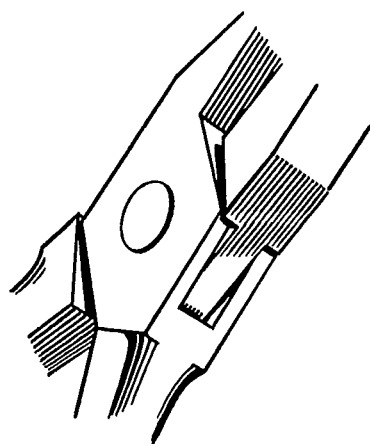
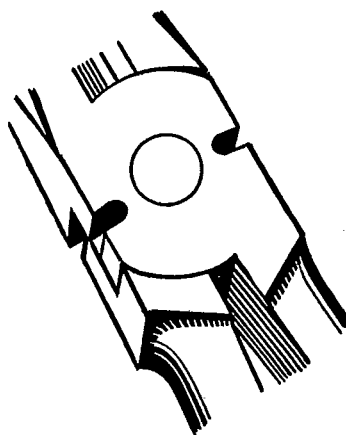


Fig. 1. Nomenclature

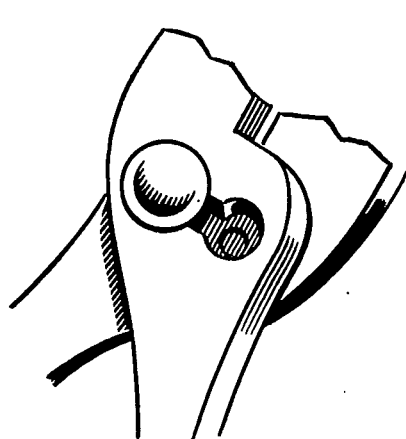
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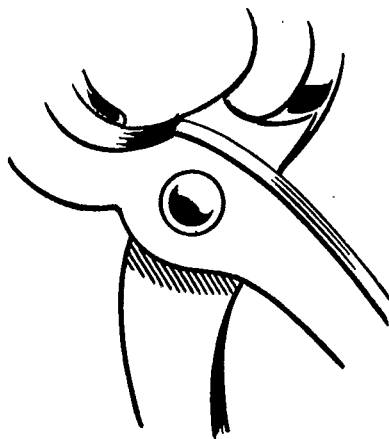
Box



Single

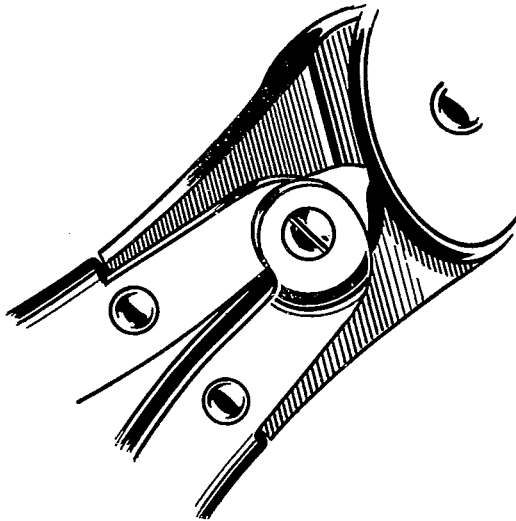


Slip

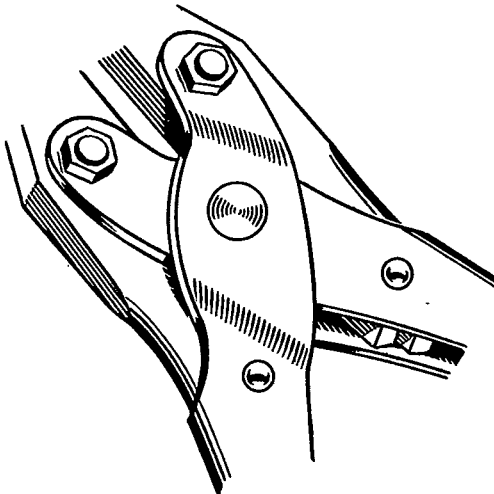


Lay-on

Fig. 2. Types of joint



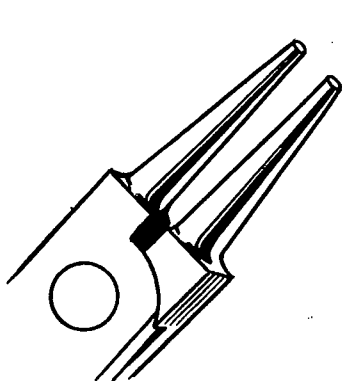
Lever assisted



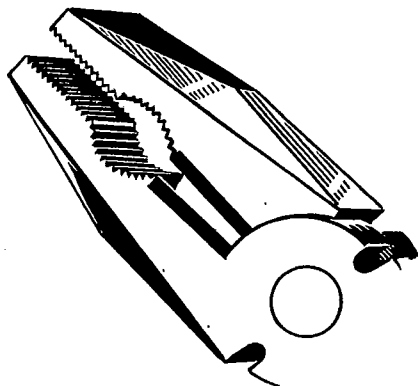
Parallel action

Fig. 2 (cont.) Types of joint

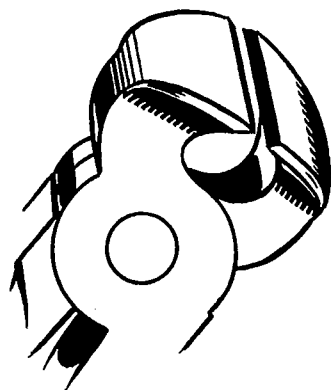
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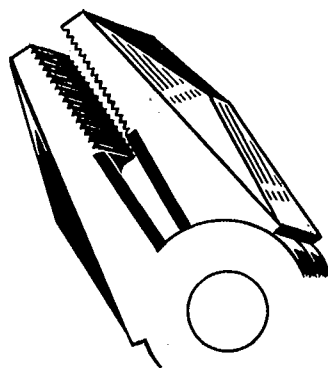
Round



Side cutting with pipe grip and serrated jaw

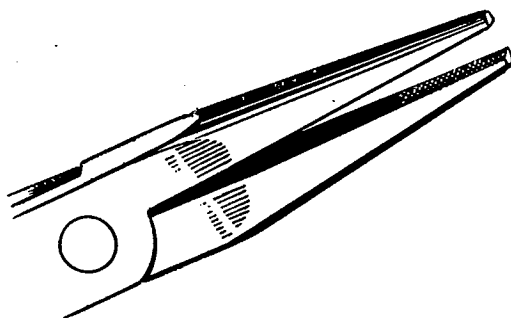


End cutting

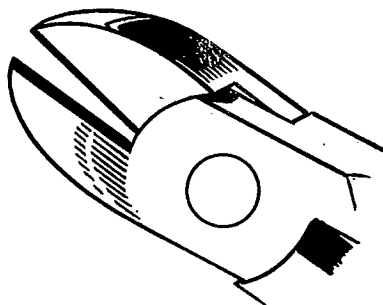


Side cutting with serrated jaw

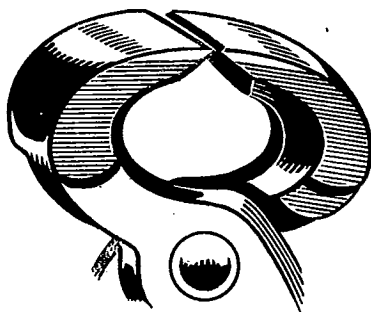
Fig. 3. Types of nose



Snipe



Diagonal cutting



Pincer (carpenters type)

Fig. 3 (cont). Types of nose

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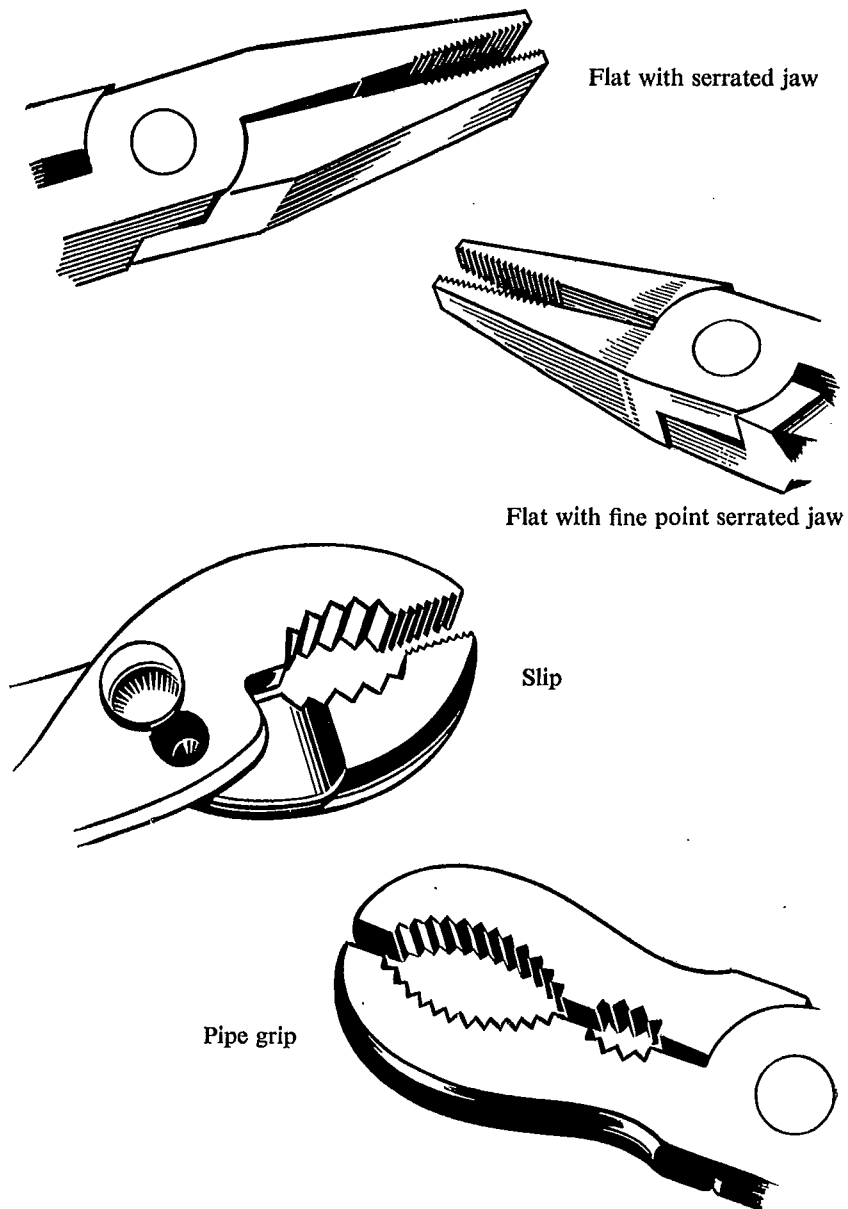
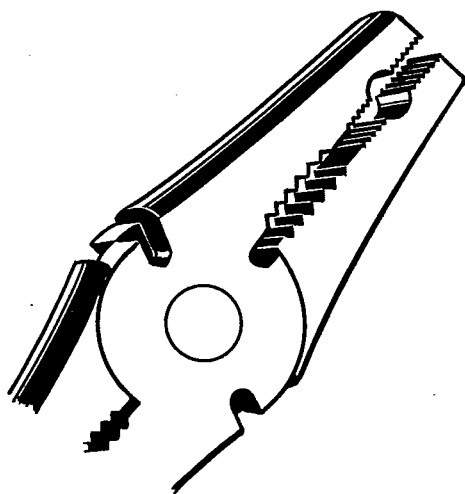
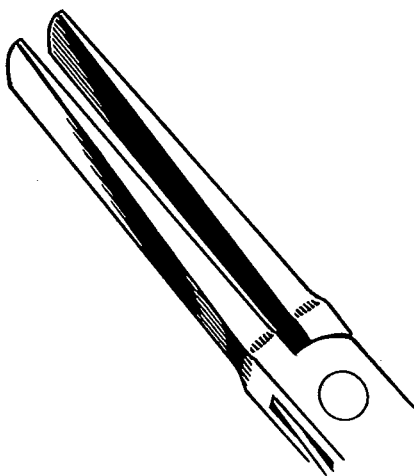


Fig. 4. Types of nose



Fencing



Duckbill

Fig. 4 (cont.) Types of nose