

July 14, 1925.

1,546,139

R. F. LÉVÉQUE

PLIERS

Filed Dec. 12, 1923

2 Sheets-Sheet 1

Fig. 2

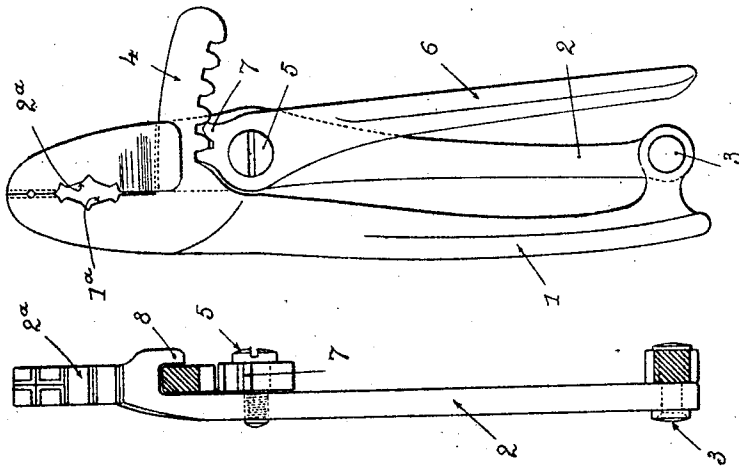
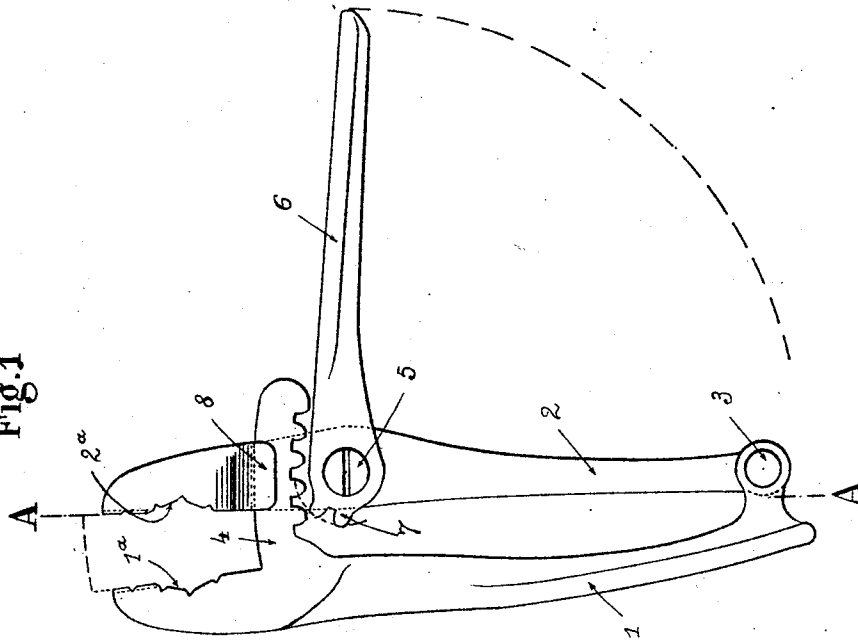


Fig. 1



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Fig. 5

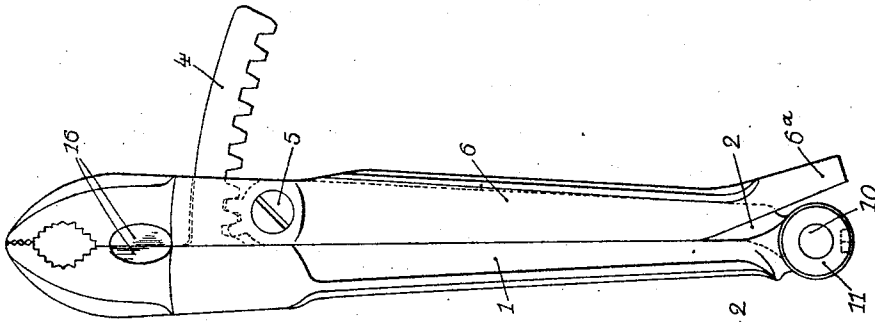


Fig. 6

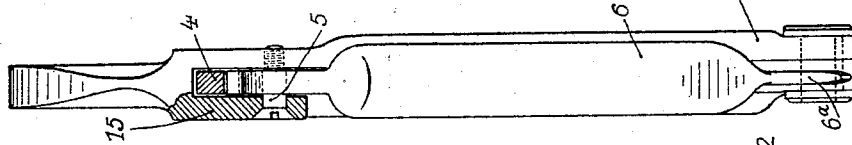


Fig. 4

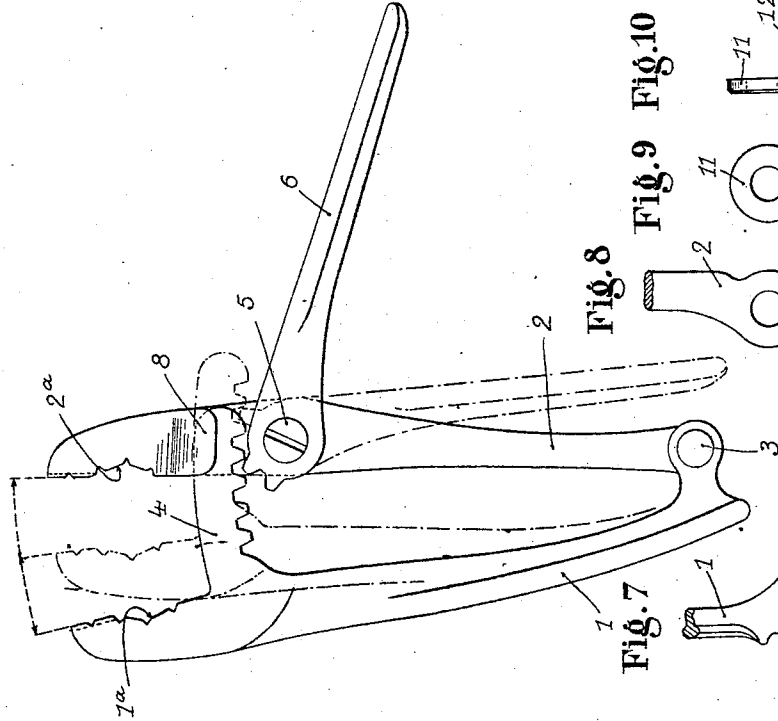


Fig. 8

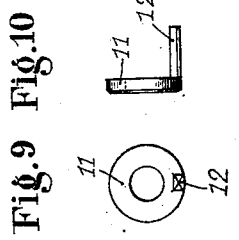


Fig. 9 FIG. 10



Fig. 7



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Patented July 14, 1925.

UNITED STATES PATENT OFFICE.

ROBERT FRÉDÉRIC LÉVÊQUE, OF ST.-QUENTIN-OESTRES, FRANCE.

PLIERS.

Application filed December 12, 1923. Serial No. 680,071.

To all whom it may concern:

Be it known that I, ROBERT FRÉDÉRIC LÉVÊQUE, citizen of the French Republic, residing at St.-Quentin-Oestres, Aisne, in the French Republic, have invented new and useful Improvements in or Relating to Pliers, of which the following is a specification.

The present invention has for its object pliers for clamping purposes, one feature whereof resides in that one of the two branches of the pliers, each of which constitutes a jaw at one end, and which are hinged upon each other at the other end, carries a toothed sector whilst the other branch carries an axle-pin around which is pivoted a lever provided with a tooth, or a portion of a pinion, adapted to engage the said toothed sector.

Such pliers offer numerous advantages: the branches cannot be spaced apart at a too great distance so that the pliers may be held very easily in the hand whatever may be the spacing between the jaws. Further, the jaws, even for large openings, make a sufficiently small angle so that the clamping is always straight i. e. at right angles with the piece clamped. On the other hand, the clamping may be very strong and is substantially the same from the innermost part of the jaws to the ends of the same, which affords the use of long jaws without it being prejudicial to the force of the pliers. Further, these pliers can be very simply manufactured and machined, and comprise a very limited number of pieces.

In the accompanying drawing which shows by way of example various forms of realization of the invention:

Fig. 1 is a front view of the pliers in a mean position of opening, the clamping lever being shown in the position which permits of selecting the teeth of the sector which are to be engaged with those of the pinion.

Fig. 2 is a section on the line A—A (Fig. 1).

Fig. 3 shows the pliers in the position of maximum closing.

Fig. 4 shows the position of the pliers at the time when one is about to proceed with the clamping of an object, the position of maximum approaching of the two jaws being shown in full and dotted lines.

Figs. 5 and 6 are respectively views similar to Figs. 2 and 3 of a modified form of pliers according to the invention.

Figs. 7 and 8 are front views of the corresponding ends of the branches of the modification shown in Figs. 5 and 6.

Figs. 9 and 10 are respectively a front view and a side view of the washer with its stud constituting the fulcrum for the two branches.

In the constructions illustrated in Figs. 1 to 4 the pliers comprise two branches 1 and 2 hinged at 3 at one end and forming jaws at the other end and at 1^a and 2^a. The branch 1 carries a circular toothed sector 4 having its centre at 3. The branch 2 carries an axle-pin 5, about which a lever 6 is pivoted, said lever serving as a handle and provided with the teeth 7 capable of being engaged with those of the toothed sector 4, the portion of a pinion formed by these teeth having the axle-pin 5 as its centre.

To hold the jaws in a correct position with respect to each other, a flange 8 is preferably made integral with the branch 2 for guiding the sector 4. The jaws may be provided with recesses on their inner face for the clamping of round pieces; they may be also provided with cutting portions.

In the position in which the lever 6 is raised (Fig. 1), the opening of the pliers may be easily adjusted. When the branches are in the desired position (Fig. 4) the lever 6 is brought towards the branch 1 by hand pressure, the teeth 7 now engage the teeth of the sector 4 corresponding to the same, and the jaws 1^a and 2^a come together (position shown in mixed lines in Fig. 4). The clamping effected is much increased in ratio, due to the gear ratio between the pinion portion 7 and the sector 4, and to the ratio between the two parts of the lever 6 on either side of the pin 5.

The pliers according to the invention may be easily handled although the fulcrum of the jaws is at a relatively great distance from the object to be clamped, and the clamping of the jaws is effected very near the object to be clamped, this being afforded by the use of the lever 6. This lever can be engaged at will and in the direction of the clamping, and its maximum outward position is independent of the spacing of the jaws.

Moreover even for wide openings, the angle between the jaws remains small, and this allows of seizing thick pieces in a practically straight position. The extreme outward position of the lever 6, being independ-

ent of the spacing of the jaws, may be just what is necessary to that pliers may be conveniently held in hand. The ratio of the effort on the jaws to the effort to be exerted on the lever may be made very high while at the same time keeping to the usual dimensions for the pliers, and by reason of the great distance of the jaws from their fulcrum, the clamping remains very strong even at the outer ends of the jaws.

In the modification shown in Figs. 5 to 10 the branches 1 and 2 are straight instead of being curved as in Figs. 1 to 4, which reduces the bulk of the pliers.

The lower ends of the branches 1 and 2 are flattened and pivoted about a pin 10 at one end whereof is riveted a washer 11 (Figs. 9 and 10) carrying a stud 12 engaged in notches 13 and 14 provided respectively in the flat ends of the branches 1 and 2. The notch 13 has a width equal to that of said stud 12, while the notch 14 is wider, which permits the branches of rotating with regard to each other but limits this rotation, consequently limiting the opening of the pliers so that the widest opening corresponds to the length of the sector 4.

In this modification the flange 15 carried by the branch 2 and serving as a guide for the sector 4 is also used for holding the axle pin, or screw 5.

Further the end 6^a of the lever 6 may be made as a turn-screw.

Various constructional modifications may be brought to the pliers described without departing from the scope of the invention. In particular, the number of teeth 7 of the pinion portion can be as desired, and may be reduced to one.

A stop-piece may also be provided at the end of the sector 4 for preventing the opening of the pliers beyond the limit determined by the length of the said sector.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. Pliers comprising two branches constituting jaws at one end hinged upon each other at their other ends and disposed over their whole length on the same side, relatively to each other, a curved tooth sector carried by one of the branches and concentric with the pivot axis of said branches, a pivot pin carried by the other branch, a lever pivoted upon said pivot pin, a portion of pinion provided on said lever and adapted to mesh with the curved toothed sector,

said toothed sector and said portion of pinion constituting an internal gear.

2. Pliers comprising two branches constituting jaws at one end hinged upon each other at their other ends and disposed over their whole length on the same side, relatively to each other, a curved tooth sector carried by one of the branches and concentric with the pivot axis of said branches, a pivot pin carried by the other branch, a lever pivoted upon said pivot pin, a portion of pinion provided on said lever and adapted to mesh with the curved toothed sector, said toothed sector and said portion of pinion constituting an internal gear, and a flange provided on said pivot pin carrying branch and projecting over said toothed sector, thus serving as a guide for the latter.

3. Pliers comprising two branches constituting jaws at one end hinged upon each other at their other ends and disposed over their length on the same side, relatively to each other, a curved tooth sector carried by one of the branches and concentric with the pivot axis of said branches, a pivot pin carried by the other branch, a lever pivoted upon said pivot pin, a portion of pinion provided on said lever and adapted to mesh with the curved toothed sector, said toothed sector and said portion of pinion constituting an internal gear, and a flange provided on said pivot pin carrying branch and projecting over said toothed sector, thus serving as a guide for the latter, said pivot pin extending through and being supported by said flange.

4. Pliers comprising two branches constituting jaws at one end, hinged upon each other at their other ends around a pivot axis and adapted to remove from each other at any desired angle, a notch provided in said other end of each of said branches, the notch in one branch being of greater width than that of the other branch, a washer secured at one end of said axle-pin and carrying a stud extending through said notches, a toothed sector carried by one of said branches, a pivot pin carried by the other branch, a lever pivoted about said pivot pin, a portion of pinion provided on said lever and adapted to mesh with the curved toothed sector, said toothed sector and said portion of pinion constituting an internal gear.

In testimony whereof I have signed my name to this specification.

ROBERT FRÉDÉRIC LÉVÊQUE.