

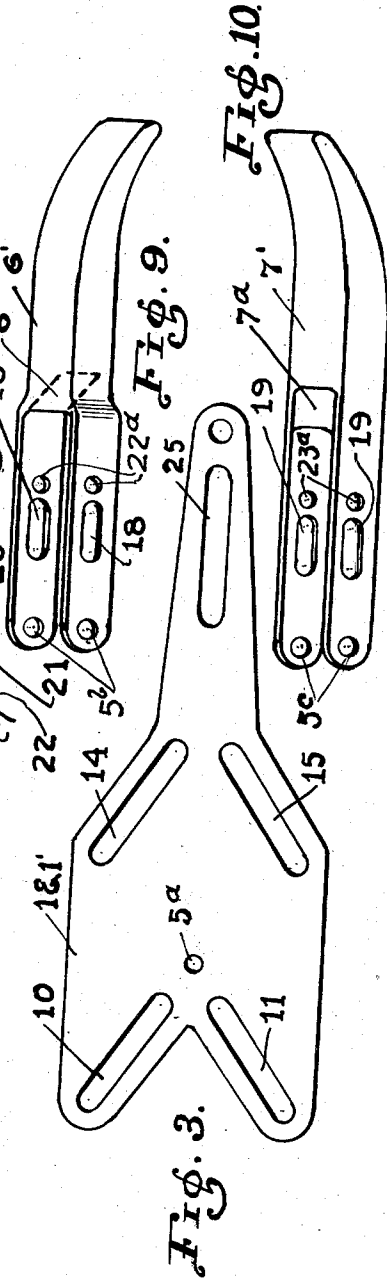
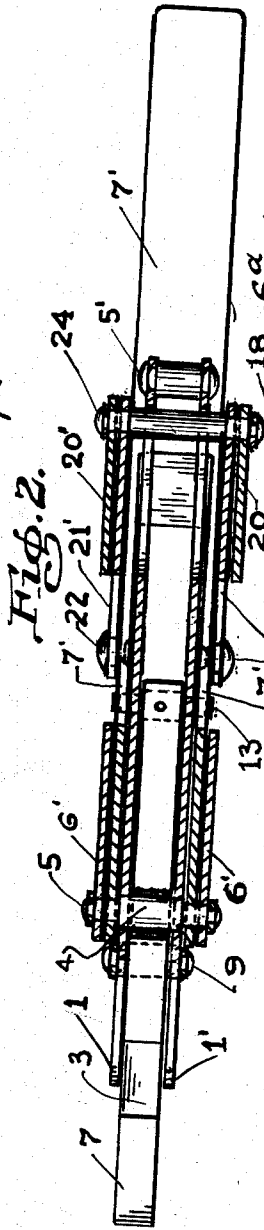
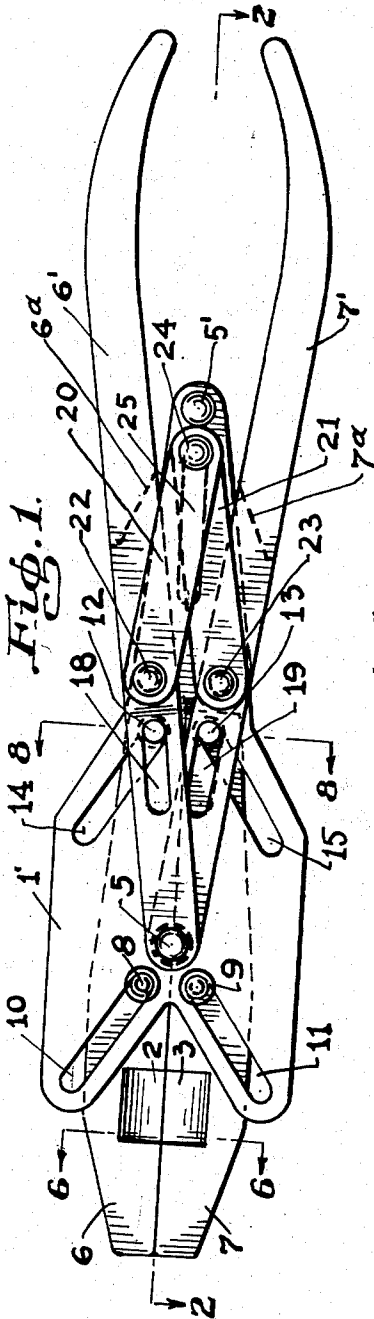
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PARALLEL JAW PLIERS

2,687,661

Filed Feb. 15, 1949

2 Sheets-Sheet 1



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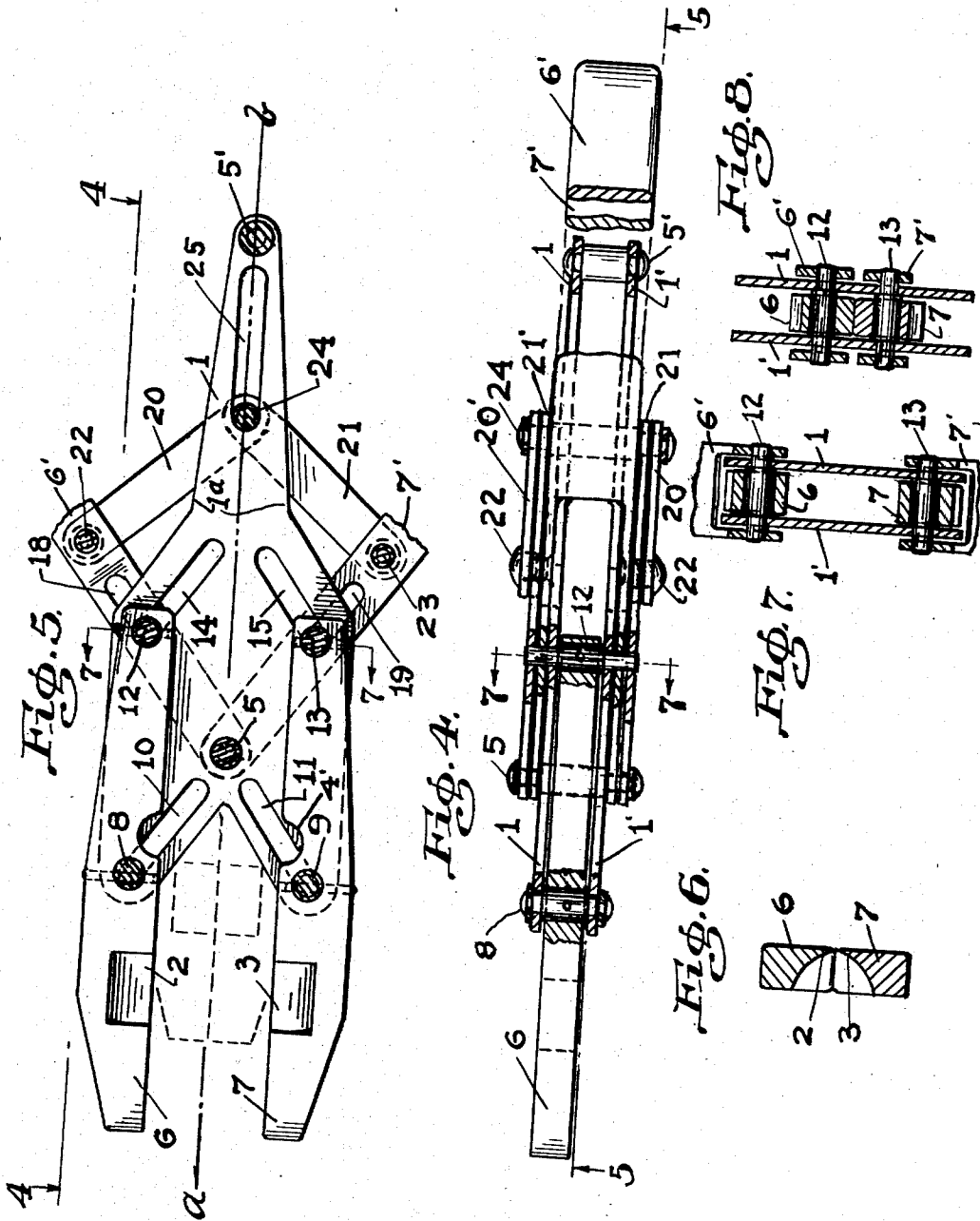
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2 Sheets-Sheet 2



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PARALLEL JAW PLIERS

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6 Claims. (Cl. 81-46)

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This invention relates to a new and useful combination of parts for operating the jaws of pliers in parallelism to each other, and particularly to a new and useful improvement in a tool of the wrench or plier type having jaws that are maintained parallel to each other.

The jaws of the pliers are caused to maintain, at all times during their opening or closing, a parallel relationship to each other by means of plates provided with cam slots and pins mounted in said jaws and slidably positioned in said cam slots.

The arms of the pliers are hingedly mounted on said plates on a hinge which is perpendicular to the plate and are connected to said jaws whereby the movement of said arms to and away from each other causes the pin to move in the cam slots to move the jaws to and away from each other while maintaining them in parallel relation.

The said slots are positioned in said plate at an acute angle to a line perpendicular to the axis of the hinge pin and the force exerted on the arms is transferred to the pin and thus to the jaws. The slots are so positioned that as the jaws are opened the pin moves in the slots toward the pivot pin, thus increasing the mechanical advantage of the pliers.

In the accompanying drawings:

Fig. 1 is a side view of the fully assembled pliers with the jaws closed;

Fig. 2 is a sectional view on line 2-2 of Fig. 1;

Fig. 3 is a detail view of the jaw pin guide plates;

Fig. 4 is a view taken on line 4-4 of Fig. 5 with the jaws in open position with parts in section;

Fig. 5 is a sectional view of Fig. 4 taken on line 5-5 with parts broken away;

Fig. 6 is a section taken on line 6-6 of Fig. 1, showing the cutting portion of the jaws;

Fig. 7 is a sectional view taken on line 7-7 of Fig. 5;

Fig. 8 is a section taken on line 8-8 of Fig. 1;

Fig. 9 is a perspective view of the upper handle 6'; and

Fig. 10 is a perspective view of the lower handle 7'.

The jaws 6 and 7 are provided at an intermediate point with the slide pins 8 and 9, which are affixed to the jaws, and at their inner ends with the pins 12 and 13 also affixed to the jaws. The pins 8 and 9 and 12 and 13 are slidable in the slots 10 and 11 and 14 and 15, respectively. Cam plates 1 and 1' carry bores on the center line *a-b* of the plates to receive the pivot pin 5 and rivet 5'. A collar 4 surrounds pin 5. The

pin 5 is positioned in the bore 5*a* in the cam plate intermediate the slots 11 and 15 and intermediate the slots 10 and 14, and the slots 11 and 15 are parallel and inclined at acute angles to the center line *a-b*. The slots 10 and 14 are also parallel and inclined at acute angles with the center line. Thus the center line bisects the angle between the slots 10 and 11 and between the slots 14 and 15.

The cam plates 1 and 1' are each provided with slots 25 positioned on the center line of the plate. The arms 6' and 7' are forked (see Figs. 9 and 10) over the jaws and plates 1 and 1', one tine of each fork being respectively hingedly mounted on the hinge pin 5 which passes through the bores 5*c* and 5*b*, and each is provided with slots 18 and 19, respectively, which act as cam faces for the pins 12 and 13. The slide pins 12 and 13 are slidably positioned in the slots 18 and 19, respectively. A pair of links 20 and 21 are provided on each side of the arms. One end of each of the links 20 is hingedly mounted on opposite sides of arm 6' on hinge pin 22 which passes through bore 22*a*, and one end of each of the links 21 is hingedly mounted on opposite sides of the arm 7' on stub hinge pin 23 which passes through bore 23*a*. The other end of the links 20 and 21 on each side of the arms is hingedly mounted on pin 24 which is slidably mounted in the slots 25, one on each of the plates 1 and 1'. The arms are undercut at 6*a* and 7*a* in order to permit them to close over the narrow extensions 1*a* of the plates 1 and 1'.

The jaws 6 and 7 of the pliers are formed adjacent their outer ends with the cutting wedges 2 and 3.

To close the jaws 6 and 7 from a full open position (Fig. 5) to closed position (Fig. 1) the arms 6' and 7' pivoted on the pin 5 are pressed toward each other, applying pressure to the pins 12 and 13. They slide rearwardly along the inclined slots 14 and 15. Since the slots 10 and 14 are parallel and 11 and 15 are parallel and form equal acute angles with the center line, the pins 8 and 9 also located in the jaws 6 and 7 are caused to slide along the slots 10 and 11 at the same speed as pins 12 and 13 in the slots 14 and 15. The jaws 6 and 7 are thus maintained parallel during their approach to each other as the lever arms 6' and 7' are moved toward each other (see Figs. 1 and 5). The center line *a-b* of the plates is maintained in a fixed position and is prevented from rotation around the hinge pin.

The line connecting center of pins 13 and 12

3 and also the line connecting pins 8 and 9 are perpendicular to the center line *a-b* throughout the movement of the jaws.

It will be observed that the force exerted by the arm 6' or 7' on the jaws 6 and 7, respectively, is exerted upon the pins 12 and 13, respectively. This lever system is a lever of the second class and the mechanical advantage is dependent upon the separation between pins 5 and 13 or 5 and 12. The closer the pins 5 and 13 and also the closer the pins 5 and 12 are together the greater the mechanical advantage. It will be observed that as the jaws are opened more and more, the length of lever arm between 5 and 13 and between 5 and 12 is shortened by the movement of the pins 12 and 13 in the cam slots 18 and 19 and in the slots 14 and 15. The links 20, 20', and 21 and 21', as stated above, are provided with pin 24 slidably positioned in the slot 25 located at the inner end of the plates 1 and 1'. Thus, when the arms 6' and 7' are moved toward or away from each other, the cam plates 1 and 1' are maintained in their proper orientation with the parallel jaws 6 and 7 as they are caused to open or close.

While I have described a particular embodiment of my invention for the purpose of illustration, it should be understood that various modifications and adaptations thereof may be made within the spirit of the invention as set forth in the appended claims.

I claim:

1. Variable spanning pliers, comprising a pair of jaws, one on each side of a center line of said pliers, lever arms, a pivot for said lever arms mounted at one end of said arms, slide pins mounted in said jaws, a cam plate, and two pairs of parallel cam slots in said plate, each pair of said cam slots being disposed at an acute angle to the center line of said pliers, said slide pins being slidably positioned in said cam slots, means on said lever arms for slidably moving said slide pins in said cam slots to actuate said jaws, said pivot being mounted in said cam plate.

2. Variable spanning pliers, comprising a pair of jaws, one on each side of the center line of said pliers, lever arms, a pivot for said lever arms mounted at one end of said arms, slide pins mounted in said jaws, a cam plate, two pairs of parallel cam slots in said plate, said slide pins being slidably positioned in said cam slots, said pivot being mounted in said cam plates, and means on said arms for slidably moving said slide pins in said cam slots to actuate said jaws.

3. A plier comprising a pair of jaws, means for moving said jaws to and from each other, said means comprising a pair of spaced slide pins mounted in one of said jaws, a cam plate, spaced parallel cam slots in said cam plate, the spaced slide pins in one of said jaws being positioned one in each of said parallel slots, a lever arm, a pivot pin in said cam plate, said lever arm being hingedly mounted on said pivot pin in said cam plate, cam faces on said arm operatively engaging one of said slide pins, said cam faces being formed to move said one slide pin in the cam slot in which it is positioned on movement of said arm, and a second lever arm associated with the other of said jaws.

4. A plier comprising a pair of jaws, a pair of spaced slide pins mounted in one of said jaws, a cam plate, a pair of spaced parallel cam slots in said cam plate, the spaced slide pins in one of said jaws being positioned one in each of said parallel slots, a lever arm hingedly mounted on a pivot positioned in said cam plate, cam faces

on said arm operatively engaging one of said slide pins, said cam faces being formed to move said one slide pin in the cam slots in which it is positioned on movement of said arm, a second pair of spaced slide pins mounted in the other of said jaws, a second pair of spaced parallel cam slots positioned in said cam plate, the said second mentioned slide pins being positioned one in each of said second mentioned cam slots, a second lever arm hingedly mounted on said pivot, and cam faces in said second arm operatively engaging one of said second mentioned slide pins, said second mentioned cam faces being formed to move said one second mentioned slide pin in its cam slot on movement of said second lever arm.

5. A plier comprising a pair of jaws, means for moving said jaws to and from each other, said means comprising a pair of spaced slide pins mounted in one of said jaws, a pair of cam plates, one on each side of said jaws, a pair of spaced parallel cam slots in each of said cam plates, the spaced slide pins in one of said jaws being positioned one in each of said parallel slots in each of said plates, a lever arm hingedly mounted on a pivot mounted in said cam plates, cam faces in said arm operatively engaging one of said slide pins, said cam faces being formed to move said one slide pin in the cam slot in which it is positioned on movement of said arm, and a second lever arm associated with the other of said jaws.

6. A plier comprising a pair of jaws, a pair of spaced slide pins mounted in one of said jaws, a pair of cam plates, one on each side of said jaws, a pair of spaced parallel cam slots in each of said cam plates, the spaced slide pins in one of said jaws being positioned one in each of said parallel slots in each of said plates, a lever arm hingedly mounted on a pivot mounted in said cam plates, cam faces in said arm operatively engaging one of said slide pins, said cam faces being formed to move said one slide pin in the cam slot in which it is positioned on movement of said arm, a second pair of spaced slide pins mounted on the other of said jaws, a second pair of spaced parallel cam slots positioned in each of said cam plates, the said second mentioned slide pins being positioned one in each of said second mentioned cam slots, a second lever arm hingedly mounted on said pivot, cam faces in said second arm operatively engaging one of said second mentioned slide pins, said second mentioned cam faces being formed to move said one second mentioned slide pin in its cam slot, maintaining said jaws in parallel relation, a pair of links, a link hinge pin for said links, each of said links being hingedly connected, one to each of said arms, a slot positioned on the center line of each of said plates, said link hinge pin being slidably positioned in said last-named slot.

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