Feb. 1, 1966 J. ALLEGRAUD 3,232,150

SLIDABLE SIDE JAW WRENCH HAVING A CAM-OPERATED SLIDABLE RACK CATCH

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Fig. 2

Fig. 1

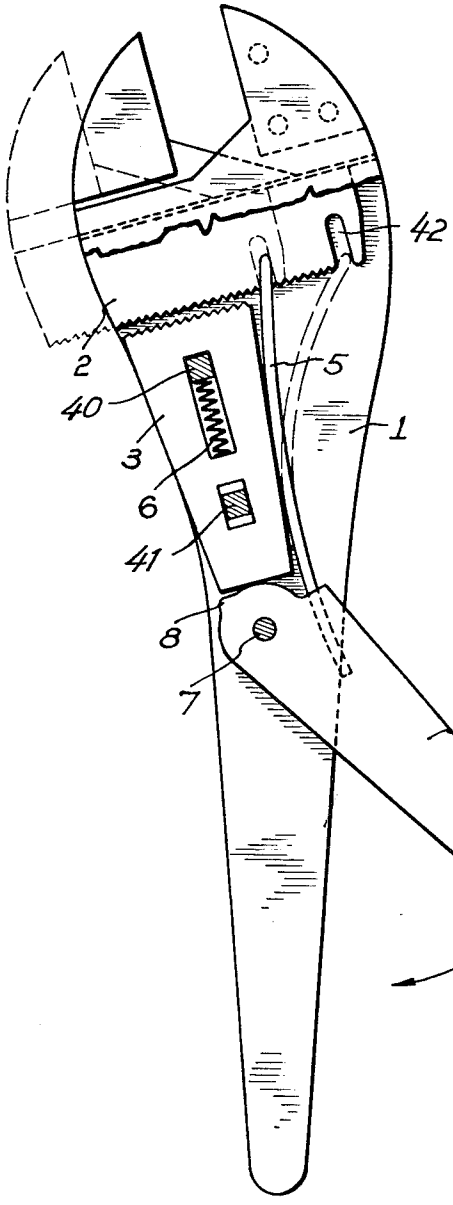
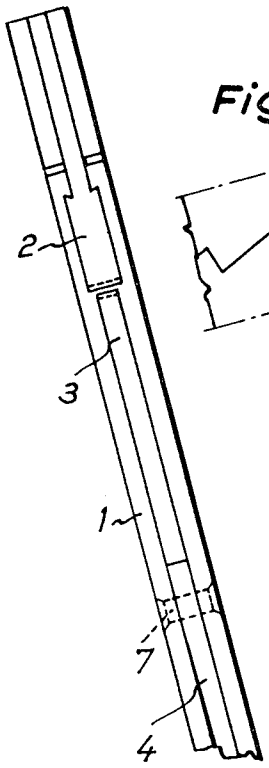
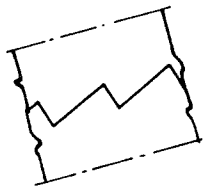


Fig. 3





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Fig. 4

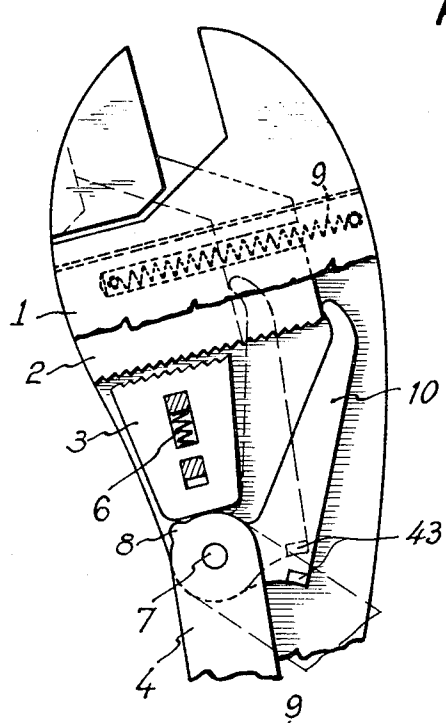
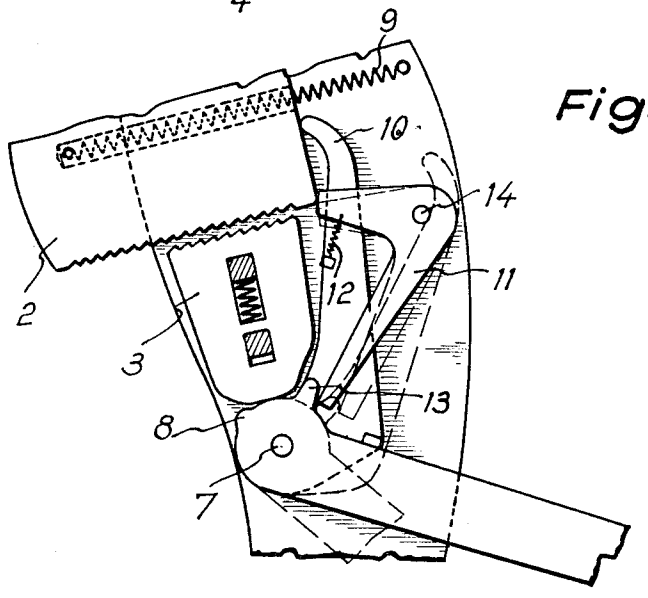


Fig. 5



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SLIDABLE SIDE JAW WRENCH HAVING A CAM-OPERATED SLIDABLE RACK CATCH

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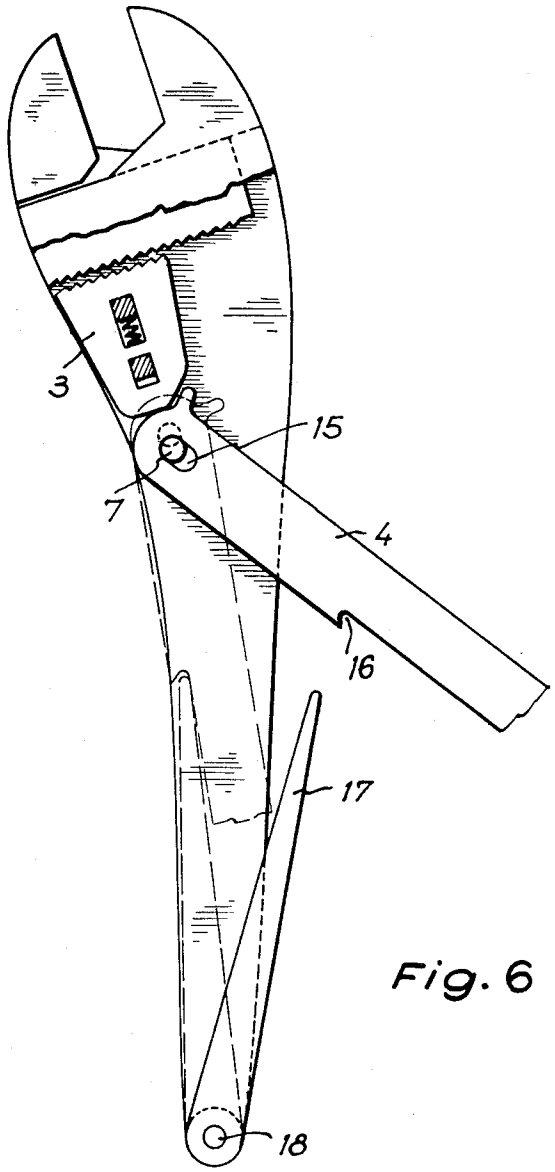


Fig. 6

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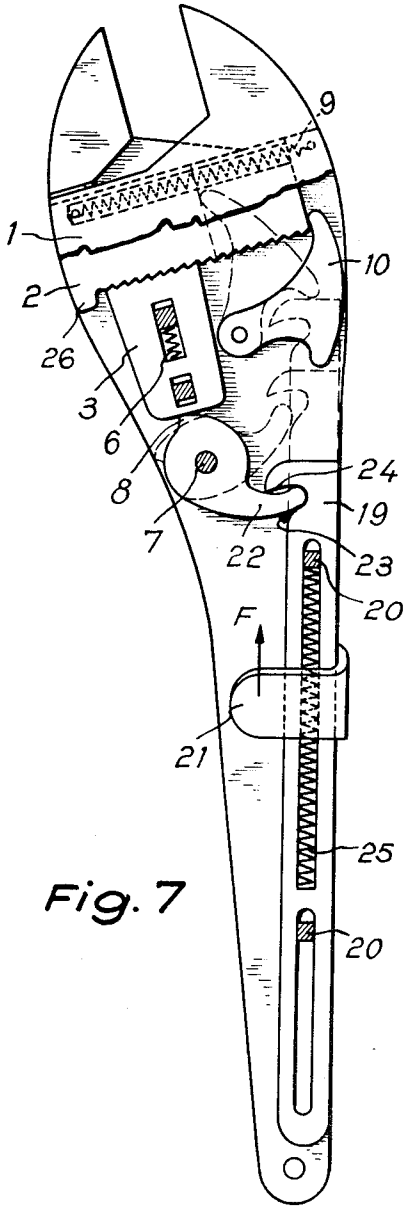


Fig. 7

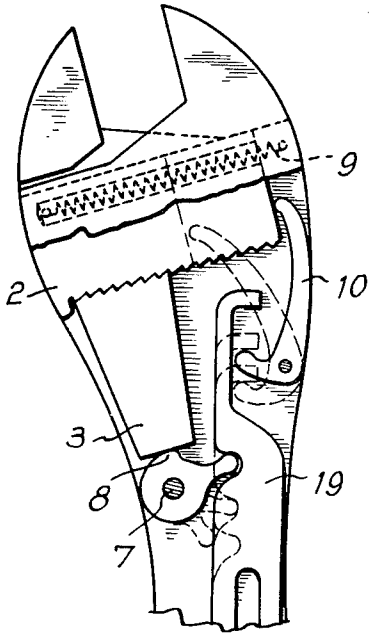


Fig. 8

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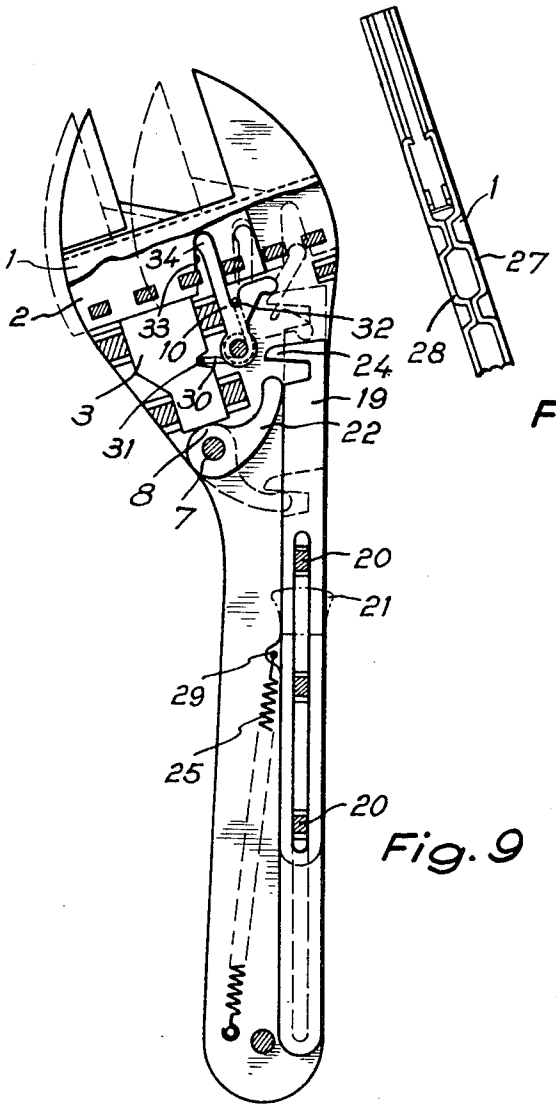


Fig. 10

Fig. 9

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3,232,150

SLIDABLE SIDE JAW WRENCH HAVING A CAM-OPERATED SLIDABLE RACK CATCH

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Filed Oct. 1, 1964, Ser. No. 400,869
12 Claims. (Cl. 81—143)

This application is a continuation-in-part of U.S. patent application, Serial No. 307,462, filed September 9, 1963, now abandoned.

This invention relates to an adjustable spanner or wrench and its objects is to provide a quick-acting spanner that will combine the advantages of adjustability whereby a single size of spanner will be usable for a wide range of nut sizes, with the advantages characterizing the simple fixed wrench, including accurate and stable spacing between the spanner jaws, and small thickness dimension of the tool. Adjustable spanners of conventional construction are liable to a ready misadjustment of their jaw spacing during handling, and are inconveniently thick.

An adjustable spanner according to the invention comprises a fixed jaw, a movable jaw displaceable towards and away from the fixed jaw, means biasing the movable jaw towards the fixed jaw, blocking formations, e.g. serrations, formed on a surface of the movable jaw parallel to the direction of its displacements, a blocker member having a surface parallel to said first surface and formed with complementary formations, e.g. serrations, said blocker member being mounted for movement towards and away from the surface of said movable jaw so as to engage and disengage its said surface with and from the said parallel surface of the movable jaw, means biasing the blocker member away from said movable jaw surface, and actuating means for displacing said blocker member towards said movable jaw surface.

Exemplary embodiments of the invention will now be described for purposes of illustration but not of limitation with reference to the accompanying drawings wherein:

FIGURE 1 is a front view, partly broken away, of a first embodiment of the improved spanner wherein the actuating cam is formed on an actuating lever of the spanner;

FIGURE 2 is a corresponding side view;

FIGURE 3 is an enlarged fragmentary view of the serrated contour formed on the blocking surface;

FIGURE 4 is a partial front view of a generally similar spanner provided with an additional pivoted lever for displacing the movable jaw in the spanner-opening direction;

FIGURE 5 shows another modification generally similar to that shown in FIGURE 4 but further including a latching pawl;

FIGURE 6 shows another form of improved spanner wherein the actuating linkage includes a pair of latchable toggle levers;

FIGURE 7 shows another embodiment wherein the actuator member is in the form of a shiftable slider;

FIGURE 8 shows a modification of the embodiment of FIGURE 7;

FIGURE 9 illustrates, partly in section, a spanner according to the invention of simplified construction; and

FIGURE 10 is a partial side view of FIGURE 9.

The adjustable spanner of the invention, as shown in FIGURE 1, includes a body member 1 formed with a fixed jaw, and a movable jaw 2 displaceable towards and away from the fixed jaw to vary the spanner opening.

As will be apparent from FIGURE 2, the spanner body 1 is made up of a pair of parallel spaced plates between which the movable jaw 2 and other components to be

described are movably received. In FIGURE 1 the front body plate is broken away to show the underlying parts. The movable jaw 2 is provided on a surface thereof parallel to the direction of its displacements, with a serrated, or rack-like, contour. A blocking member 3 is mounted on the body 1 for limited movement towards and away from the serrated surface of the movable jaw member, being guided in such movement with a minimum amount of lateral clearance by means of a pair of spaced guide pegs 40, 41 movable in slots of the member 3, as shown. The blocker member 3 has a surface facing the serrated surface of movable jaw member 2 which is provided with complementary serrations, as shown. A spring 6 acting between the guide stud 40 and a surface of member 3 biases this member away from the serrated surface of jaw member 2. An actuating lever 4 pivoted at 7 to the body 1 is formed with a camming projection 8 engageable with the end surface of blocker 3 remote from its serrated surface, whereby rotation of lever 4 (clockwise in FIGURE 1), as shown by the arrow, to engage projection 8 with the member 3 will urge the latter towards the movable jaw member 2 against the bias of spring 6, and will engage the serrated surfaces firmly against each other, thereby blocking the movable jaw in any selected position.

The sliding connection provided between movable jaw member 2 and fixed jaw or body member 1 is preferably dovetailed, as shown in FIGURE 2. This makes it possible to apply large forces to the blocking member 3 without causing any separation between the outer side surfaces of the guideway.

As shown in FIGURE 3, the serrations of the cooperating blocking surfaces may conveniently be sawtooth in shape, though other contours may be used. The pitch of the serrations is preferably predetermined with regard to standard nut diameters so as to achieve close blocking action for all sizes of nuts.

As shown in FIGURE 1 a quick-acting characteristic may be imparted to the spanner both in regard to opening and closing movements by providing a strong leaf spring 5 having one end finally secured in the actuating member 4 and its other end engaging in a notch 42 provided in the movable jaw member 2 near the appropriate end of its serrated surface. The arrangement is such that rotation of actuating lever 4 about its pivot 7 in either direction will act on the movable jaw member 2 to snap it rapidly towards either its closed or its fully open position. The elasticity of leaf spring 5 is such that when the movable jaw 2 is arrested in its inward or closing movement due to engagement with a surface of a nut held between the jaws of the spanner, rotation of lever 4 in the same direction can be continued to accomplish the camming action of projection 8 on blocker member 3 and produce the desired blocking effect.

In the embodiment illustrated in FIGURE 6, only the camming arrangement differs from that described above. In this case the actuating lever 4 is pivoted about the pivot 7 by means of an elongated aperture 15 and its upper end is not provided with a camming projection. A notch 16 formed in a side of lever 4 is engageable by the tip of a latching arm 17 pivoted to the lower end of the spanner body 1 at 18. Rotation of lever 4 in the closing direction (clockwise) engages notch 16 with the end of arm 17, whereupon continued rotation of lever 4 in the same direction forces said lever upward by the amount permitted by the length of slot 15 to the position shown in broken lines, in which the blocking member 3 is urged to its blocking position with respect to the serrated surface of movable jaw 2. This embodiment has an advantage in that wear of the parts is reduced, and such wear can, moreover, be easily taken up by adjusting the pivot 18.

If desired the quick-acting leaf spring 5 of FIGURE 1 may be readily associated with the embodiment of FIGURE 6.

In FIGURE 4, a spring 9, herein a tension spring, is shown associated with the jaw members 1 and 2 to bias the movable jaw 2 towards its closing position with respect to jaw 1. It will be understood that a similar biasing spring may be provided in either of the embodiments earlier described. Moreover, there is here provided an arm 10 pivoted coaxially with the actuating lever 4 about pivot 7, and having a projecting nose at its free end which engages the side of jaw member 2. Arm 10 has an abutment lug 43 projecting from it and engageable by a side of actuating lever 4 when the latter is rotated in the counterclockwise opening direction, as shown in broken lines. When such engagement has occurred the arm 10 will urge the movable jaw 2 to open position against the action of tension spring 9. When on the other hand actuating lever 4 is rotated in the (clockwise) closing direction, lever 10 is rotated in the same direction by the action of spring 9 tending to move the movable jaw 2 in the closing direction, and the movable jaw 2 comes to rest in engagement with a nut held in the spanner. Thereafter continued rotation of lever 4 (clockwise) will produce the camming action earlier described resulting in the blocking of the movable jaw 2 in its position.

In FIGURE 5 the arrangement is the same as in FIGURE 4, but there is additionally provided a latching pawl 11 pivoted at 14 to the fixed spanner body member 1, and having an upper arm engageable with a side edge of movable member 2, as shown in full lines, to hold the movable member 2 in an open position. Thus the spanner is retained in its open position without the user having to exert any muscular effort on the actuating lever 4. A small tension spring 12 biases the latch pawl 11 in the (counterclockwise) direction for engagement with movable member 2. When actuating lever 4 is rotated (clockwise) in the blocking direction, a finger 13 provided on the hub of lever 4 engages a lower arm of latch pawl 11 to roate it to the position shown in broken lines in which it disengages movable jaw 2. The movable jaw is thus released and is immediately moved by spring 9 in the closing direction until it engages the side of a nut held in the spanner, as in the embodiment of FIGURE 4, since the arm 10 has sufficient angular freedom about its pivot 7 as determined by the rotation of lever 4, not to interfere with this closing movement of movable jaw 2. Lever 4 can then complete its (clockwise) rotation to produce the blocking action earlier described.

When lever 4 is rotated (counterclockwise) in the spanner-releasing or opening direction, it first causes disengagement of the blocker member 3 from movable jaw 2 in an initial arc of its rotation, then it picks up arm 10 so that arm 10 now rotates bodily with lever 4 and moves movable jaw 2 in the opening direction as described with reference to FIGURE 4. During this movement of lever 4 the finger 13 is withdrawn, allowing pawl 11 to respond to the force of spring 12, so that this pawl moves to its latching position, in engagement with a side of the movable jaw 2 as soon as the latter has moved past it.

While in both embodiments of FIGURES 4 and 5 last described the camming action is shown as being effected in the manner described with reference to FIGURE 1, it will be apparent that the modified camming action of FIGURE 6 might well be used instead.

In the embodiment of FIGURE 7, the fixed and movable jaw members 1 and 2, the blocker member 13 and spring 9 are all similar to the correspondingly numbered parts earlier described. There is also provided the opening arm 10, corresponding in function to arm 10 of FIGURES 4 and 5, but of modified shape. Here opening arm 10 is pivoted to body member 1 about a pivot separate from the cam pivot 7 and is actuated in a manner that will presently appear. The camming projection 8 acting on blocker 3 is provided at the periphery of a generally

circular cam disk pivoted on pivot 7 and not adapted for direct manual actuation by means of a rotatable lever as in the foregoing embodiments. In this case the actuating member is provided in the form of a slider member 19 guided for vertical sliding movement on the body member 1 by means of the guide pegs 20 projecting into slots of the member 19. A compression spring 25 urges slider 19 (downward) away from the spanner jaws. Slider 19 has a cutout 23 in its side surface near its upper end, which is engageable with an arcuate finger 22 projecting from the camming member. Moreover, the uppermost surface of slider 19 is engageable with a downwardly projecting part of arm 10. A finger-grip flange 21 is secured around slider 19 for convenient actuation.

In operation, when the user acts on fingergrip 21 to shift slider 19 (upwards) as indicated by arrow F, cutout 23 first engages cam finger 22 to rotate the cam (counterclockwise) so that camming finger 8 is removed from beneath blocker 3, and the blocker releases movable jaw member 2. Further (upward) movement of slider 19 causes its top end surface to engage the arm 10 to rotate this arm and cause opening movement of movable jaw 2.

When the finger-grip 21 is released, the slider 19 snaps back to its initial (lower) position by the action of spring 25. In the initial part of this return movement arm 10 is released allowing the movable jaw 2 to close in on a nut held in the spanner, under the force of spring 9. Shortly thereafter cutout 23 of slider 19 engages cam finger 22 and rotates the cam (clockwise) in the blocking direction, thereby blocking the movable jaw member in its position.

It will be observed that the energy stored in the compression of spring 25 and then released as kinetic energy of the downwardly moving slider 19 is wholly utilized in forcing the blocker member 3 against the movable jaw, so that a strong blocking action is obtained. If desired, however, the spring 25 may be omitted and the downward, blocking shift of slider 19 may be performed manually.

The modification shown in FIGURE 8 differs from the embodiment just described in that the parts are so arranged that the directions of movement of slider 19 are reversed; namely, upward shifting of slider 19 effects blocking, and downward movement effects release. Otherwise, the operation is essentially the same as that just described so that further explanation should be unnecessary.

The modification shown in FIGURES 9 and 10 is essentially similar in its design and operation to the embodiment of FIGURE 7, but is constructed from stamped and press-formed metal sheet, thereby permitting very inexpensive manufacture. The body and fixed jaw member 1 of the spanner is made from a pair of opposite, flanged shells 27, 28 of steel sheet. Bosses and openings are stamped in the shells to receive the various components of the mechanism earlier described in assembled relation. The movable jaw member 2, blocking member 3, cam 8 and slider 19 are also preferably made of steel stampings. As a minor difference with respect to the arrangement shown in FIGURE 9, the spring 25 is disposed laterally with respect to slider 19, having one end anchored to a lug 29 projecting from a side of the slider and its opposite end anchored to the lower end of the body member. Moreover, the springs 6 and 9 of the embodiment shown in FIGURE 7 are here omitted and there is instead provided a single spring 30 in the form of a coil of spring wire having one projecting end engaging in a notch 31 formed in the blocking member 3 and its opposite end received in a notch 32 in the rocker arm 10. The movable jaw member 2 is formed with a recess 33 in its under side, receiving a finger 34 of the rocker arm 10, when the latter is rotated by the upward shifting of slider 19, thereby to move movable jaw 2 in the opening direction in opposition to the force of spring 30.

It will be understood that a great variety of modifications other than those shown and explicitly referred to

may be conceived without departing from the scope of the invention. Various features disclosed with reference to certain embodiments may be incorporated in others. The shapes and paths of motion of the respective components of the mechanisms may be modified while retaining their essential modes of cooperation. The retracting movement of the blocker member **3**, instead of being produced by a spring such as **6**, may be positively effected by an appropriate cam movable with the actuator lever. The forward or blocking movement of blocker **3**, instead of being the result of a camming action as described in all of the embodiments shown, may be effected directly by finger action, or by the insertion of a retractible actuating finger, or otherwise. The blocking member **3**, instead of being mounted for parallel translation between its blocking and retracted positions may be mounted for rotation between such positions, or for combined translation and rotation. The operating mechanism, instead of being mounted between two spaced side members of the fixed spanner body, as shown herein, see especially FIGURES 2 and 10, may instead be arranged externally, on one of the side faces of a single plate forming the body of the spanner, where it would be more easily accessible for repairs. Means may be provided for protecting the serrations of the movable jaw member **2** in wide-open position. For this purpose, in fact, there has been shown in FIGURE 7 a downwardly projecting lug **26** at the outer end of said serrated surface. The blocking formations on the cooperating blocking surfaces of parts **2** and **3** may assume various forms other than the serrations described and shown.

What I claim is:

1. An adjustable spanner comprising a body having a fixed jaw, a movable jaw displaceable towards and away from the fixed jaw, means biasing the movable jaw towards the fixed jaw, blocking formations on a surface of the movable jaw parallel to the direction of its displacement, a blocker member having a surface parallel to said first surface and formed with complementary blocking formations, said blocker member being mounted on the body for movement towards and away from the movable jaw so as to engage and disengage its said surface from the complementary surface of the movable jaw, means biasing the blocker member in a retracting direction away from the movable jaw, actuating means for moving the blocker member towards the movable jaw for engaging said surfaces, said actuating means including a cam pivoted on the body and having a camming surface cooperating with the blocker member for advancing it to its engaging position, an actuating lever integral with said cam, jaw adjustment means adapted to be actuated simultaneously with said actuating lever to separate the movable from the fixed jaw when the actuating lever and the cam are moved away from the position wherein the blocker member engages the movable jaw.

2. A spanner according to claim **1**, including latching means for latching the cam and lever in the position thereof corresponding to the blocking position of the blocker member.

3. A spanner according to claim **2**, wherein said cam and lever integral therewith are pivoted to the body with substantial clearance about the pivot axis, and the latching means comprises a further lever pivoted to the body and cooperating means are provided on the respective levers for interengagement during rotation of the actuating lever in one direction, interengagement of said means shifting said cam and actuating lever about said pivot to a position for advancing the blocker member to its blocking position.

4. A spanner according to claim **1**, wherein the jaw adjustment means includes a leaf spring having opposite ends engaged with the actuating lever and movable jaw, and tending to urge the movable jaw in the closing or opening direction depending on the direction of rotation of the actuating lever.

5. A spanner according to claim **1** wherein the jaw adjustment means includes an arm pivoted to said body and engageable with the movable jaw to move the latter in its opening direction, and wherein said actuating means, on being actuated in a releasing direction, urges said arm into engagement with the movable jaw.

6. A spanner according to claim **5**, wherein the actuating means comprises a rectilinearly slidable member mounted on the body and engageable with said actuating lever for rotating the cam between its blocking and releasing positions.

7. A spanner according to claim **6**, including a spring biasing the slidable member to a blocking position.

8. A spanner according to claim **7**, wherein said slidable member further acts on said arm.

9. A spanner according to claim **1**, including a latching pawl engageable with the movable jaw to latch it releasably in open position.

10. A spanner according to claim **1**, wherein the movable jaw is slidable with respect to the fixed body of the spanner by way of dovetail slideways.

11. A spanner according to claim **1**, wherein the fixed body of the spanner comprises a pair of side members maintained in parallel spaced relation, and the movable jaw as well as the other components described are mounted for movement between said side members.

12. A spanner according to claim **11**, wherein said body side members are press-formed stampings, and have openings and bosses stamped therein for mounting said movable jaw and other components in operatively assembled relation.

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