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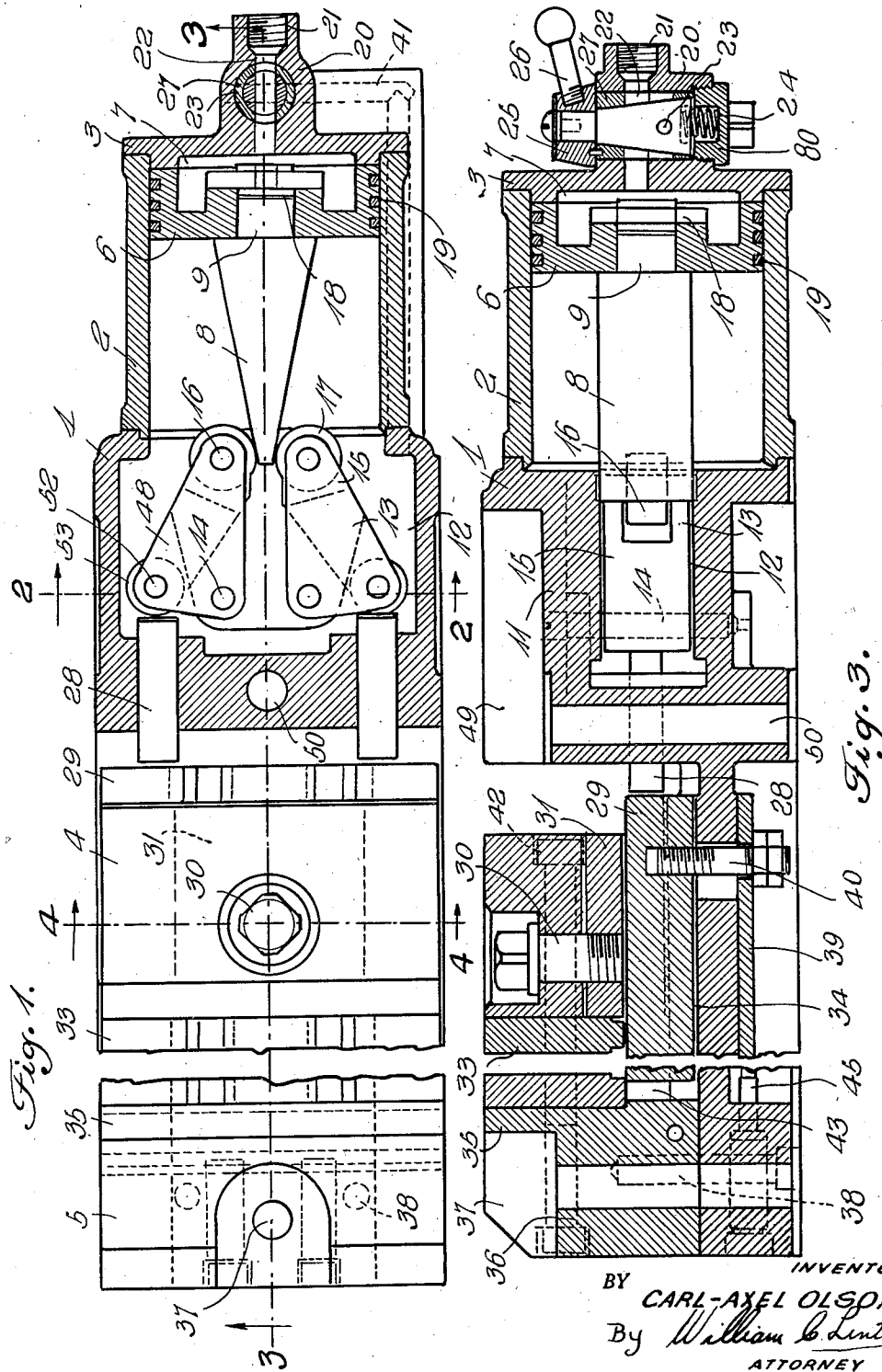
CARL-AXEL OLSON

2,443,775

FLUID PRESSURE OPERATED VISE

Filed June 1, 1945

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

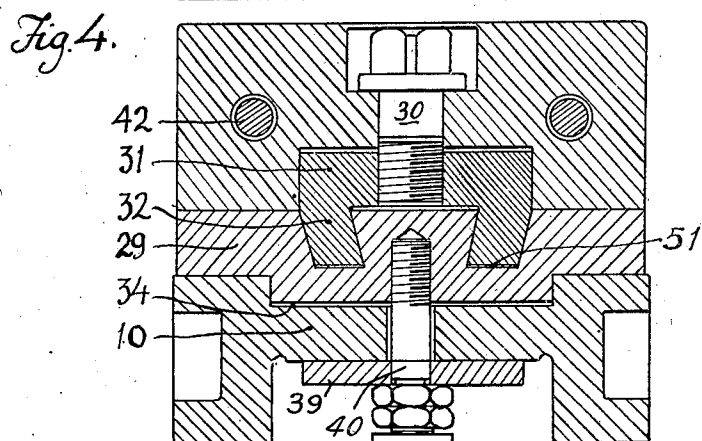
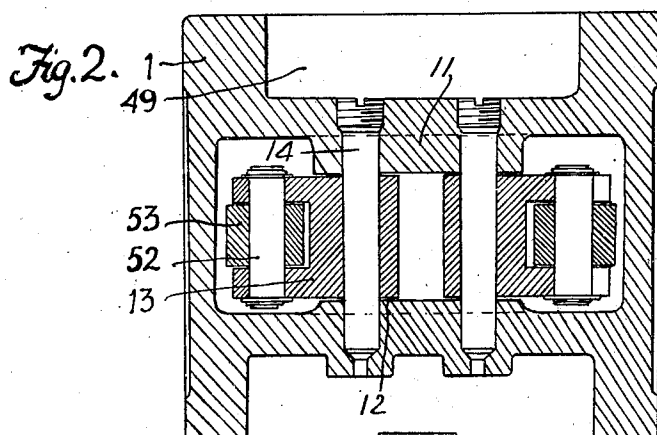
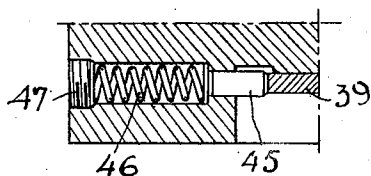


Fig. 5.



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FLUID PRESSURE OPERATED VISE

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4 Claims. (Cl. 81—17.2)

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For rapid clamping and loosening of work pieces vices are made use of, which are actuated by some source of power other than hand power. Thus, for example, one would use pneumatically or hydraulically operated clamping plungers adapted directly to actuate a movable clamping jaw. In certain cases, one would use pneumatic pressure for the displacement of plungers, which would in turn bring about a plunger movement imparting pressure to the oil, which oil pressure would then act upon a plunger rigidly connected with a displaceable jaw. In the loosening of the work piece, the air pressure and thus the oil pressure would be reduced so as to permit the movable jaw to release the work piece.

All of these and other clamping methods have advantages as well as drawbacks. The present invention has obviated the drawbacks, however, and furthermore shows a considerable cheapness relatively to the known types.

The invention is distinguished by a clamping device, such as a vice, wherein the power for pressure or pull in one or more of the jaws is exerted by means of air or oil pressure, or both, acting upon one or more plungers, the power being transmitted to the movable jaw from the plunger or plungers by means of one or more wedges fixed to the plunger or plungers or pivoted thereto or arranged thereon in some other manner, said wedge or wedges causing, at the displacement of the plunger or plungers, a rotary movement with its or their wedge surfaces on one, two or more bell crank levers, which are in turn pivoted about pins arranged in a part rigidly connected with the vice, the other lever or levers of the bell crank levers being at the same time adapted to actuate the movable jaw (slide), so that the latter is displaced to retain the work piece, and vice versa.

Moreover, the invention is characterized in that the wedge or wedges are made with conical or curved wedge surfaces, that the bell crank levers adapted to actuate the movable jaw are provided at the end thereof with rollers, by means of which the power is transferred onto the compressive surface provided with the movable jaw, that the wedge or wedges are so arranged that, when the plunger or plungers are displaced, the same will exert their power by a pulling effect on the respective levers and thus on the movable jaw.

The invention is illustrated by way of example in the accompanying drawings, wherein Fig. 1 shows a clamping device according to the invention viewed in part from above and in part in horizontal section. Fig. 2 is a sectional view on

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the line 2—2 of Fig. 1 and shows the same clamping device viewed in cross section through the lever axes. Fig. 3 shows a longitudinal vertical section of the clamping device and is taken on the line 3—3 of Fig. 1. Fig. 4 is a sectional view on the line 4—4 of Fig. 1 and shows a cross section through the adjustable clamping jaw. Fig. 5 is a horizontal section of a detail for the returning of the clamping jaw.

In the drawings, 10 designates the stationary lower portion of the clamping device, which is rigidly connected with the stationary clamping jaw 36 by means of bolts 36. Extending through the whole is an aperture 37 for the securing of the clamping device to a table. The clamping plate 35 proper is secured to the upper portion 5 of the clamping jaw by means of a screw. Arranged beneath the bottom portion 10 is a movable plate 39, which is in turn screwed to a slide piece 29 by means of bolts 40, said slide piece running over the slide plane 34 and extending over the whole clamping device, while being connected through spindles 28 to the pneumatic contrivance according to the invention for the clamping operation. Adjustably arranged on the slide piece 29 is the movable jaw 4 with a clamping plate 33, which is secured to the jaw by means of a bolt 42, and is otherwise adapted to run over a slide 31 having two branches 32. See Fig. 4. The jaw 4 is adjusted into various positions relatively to the slide piece 29 by means of the bolt 30. The slide piece 29 with the movable jaw 4 will, when coupled together, move for a very small distance of two or three millimeters as a maximum. In accordance with the invention, the jaw 4 is first adjusted relatively to the slide piece 29, and the pneumatic power brings about the requisite compression between the clamping plates 35 and 33 by means of the force acting against the spindles 28. When this force ceases, the work piece is loosened by the fact that the movable jaw 4, 29 is returned by means of the spring 46, which is strained by means of the nut 47 into the lower portion of the clamping device so as to actuate the plate 39 over the part 45. See Fig. 5.

The clamping power on the spindles 28 is produced as follows. Provided in the front portion 1 of the clamping device, which is rigidly connected with the substructure 10, is a recess 12, wherein operate two levers 13 provided with double arms. The levers 13 move about rigidly mounted pins 14, which are secured in the middle portion 11 of the clamping device. The one arm 48 of the two different arms of the levers is provided with a milled-out portion receiving a roll-

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er 53, which is movable about a pin 52. The other lever arm 15 likewise has a milled out portion therein having a roller 17 movable therein, which is rotatable about a pin 16. Arranged on the stationary part of the vice is a plunger cylinder 2 receiving a plunger 6 with packing rings 19. The cylinder 2 has a cover 3 having an air intake 21 provided therein, the air being conveyed through a passageway 22 arranged in the valve housing 20. The valve housing also has the plug-cock 25 arranged therein, said cock consisting of the conical portion 23 secured by the nut 30 and kept in position by the spring 24 within the housing 20 and the lining 27, which is conical on the inside and cylindrical on the outside thereof. The plug-cock is actuated by an arm 26 and is otherwise formed as a three-way cock, so that the air may pass through channel 22 directly into the space 7 to propel the plunger 6 or through the passage 41 to enter into the chamber 12 to return the plunger 6.

Clamped to the plunger 6 by means of a cylindrical pin 9 is a wedge-shaped part 8 having the wedge-shaped surfaces lying in vertical planes. The wedge 8 enters between the two rollers 17. 49 denotes recesses provided in the clamping device to make room for the nut of a bolt extending through the hole 50 for the clamping of the clamping device at a table.

The arrangement operates in the following manner: The jaw is fixed on the slide plane 29, so that the span will be inconsiderably greater (for instance 3 millimeters) than the width of the material to be clamped fast. After that, the object is fitted in between the clamping plates 33, 35, the cock arm 26 being turned so as to admit compressed air into the space 7. The plunger then moves toward the left in the drawing, and the wedge forces the rollers 17 apart, which results in that the rollers 53 press upon the spindles 28 and thus on the slide piece 29, so that the object is clamped fast. When the object is to be loosened, the air is released by a turning movement of the cock arm 26, or, the air is conveyed through the channel 41 toward the other side of the plunger, so that the pressure ceases and the spring 41 becomes effective for the return movement.

The invention may also be carried into effect in other ways without the scope of the same being exceeded. In addition to air, it is also possible to use liquid or different gases as an operating medium.

What I claim is:

1. A fluid pressure operated vice comprising in combination a frame, a stationary jaw mounted upon said frame, a movable jaw, retracting means for normally retaining said movable jaw in one position upon said frame, a pair of spindles independently and slidably mounted within said frame, a pair of bell crank levers pivotally mounted within said frame, a cylinder secured to said frame, a fluid operated plunger arranged within said cylinder and a wedge carried by said plunger for engagement with said bell crank

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levers whereby the latter at times will be caused to contact said spindles for moving said movable jaw towards said stationary jaw against the action of said retracting means.

2. A fluid pressure operated vice comprising in combination a frame, a stationary and a movable jaw mounted upon said frame, a pair of spindles slidably mounted in said frame and at times adapted to engage said movable jaw, a pair of bell crank levers pivotally mounted upon said frame and adapted to engage said spindles, a fluid operated plunger, a wedge extending from and concentrically arranged upon said plunger and said wedge having two wedge surfaces engageable with said bell crank levers whereby, when said plunger is moved in one direction said bell crank levers will cause said spindles to slidably engage said movable jaw.

3. A fluid pressure operated vice comprising in combination a frame, a stationary jaw and a movable jaw mounted upon said frame, a pair of spindles slidably mounted upon said frame and at times adapted to contact said movable jaw, a pair of pins mounted within said frame, a bell crank lever pivotally mounted upon each pin, a roller carried by each bell crank lever and adapted at times to contact with said spindles, a fluid operated plunger, a wedge extending from and concentrically arranged upon said plunger and said wedge having two wedge-shaped surfaces each engageable with one of said bell crank levers.

4. A fluid pressure operated vice comprising in combination a frame, a stationary jaw mounted upon said frame, a movable jaw, retracting means for normally retaining said movable jaw in one position upon said frame, a pair of spindles independently and slidably mounted within said frame, a pair of bell crank levers pivotally mounted within said frame, a roller carried by each bell crank lever and engageable with said spindles, a cylinder secured to said frame, a fluid operated plunger slidably mounted within said cylinder and a wedge carried by and concentrically arranged upon said plunger for engagement with said bell crank levers whereby the latter at times will cause the rollers carried thereby to contact said spindles for moving said movable jaw towards said stationary jaw against the action of said retracting means.

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